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California Plant Notes II 44

By
CARL B. WOLF

RANCHO SANTA ANA BOTANIC GARDEN
of the
NATIVE PLANTS OF CALIFORNIA
Santa Ana Cañon, Orange County, California
Established 1927 in Memory of
JOHN W. BIXBY

OCP. 1:2

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of the
NATIVE PLANTS OF CALIFORNIA
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The Board of Trustees and the Advisory Board hold semi-annual field days in April and October at the Garden.

CALIFORNIA PLANT NOTES II

By Carl B. Wolf

In the following pages a number of notes is presented on California plants, some are the descriptions of what we believe to be new entities, others new records in distribution, either for the state or within the state and the remainder are largely field and Garden observations about previously known plants. It is hoped that these notes will be of value to those interested in the California flora. A number of records are listed for the New York, Clark and Kingston Mts. of the eastern Mojave Desert, mountain ranges which we feel will eventually prove to be as important botanically as the Providence and Panamint Mts., which were early accessible and have thus gained botanical notoriety.

In addition to our own facilities for studying the California flora we have been graciously allowed access to the collections of the Dudley Herbarium, the University of California, the California Academy of Sciences and Pomona College. Our thanks are tendered to those in charge of the collections at the above herbaria not only for the use of their specimens, but also for the contribution of numerous miscellaneous items of information and advice about the plants here included.

It is our belief that the publication of miscellaneous notes on the California flora should be supplemented by herbarium specimens distributed rather widely to other institutions as well as deposited in our own herbarium. In order to economize on space in citing these specimens of our collections, the herbaria to which they have been distributed have been listed below in numerical sequence. Thus a specimen from this set is listed as follows: (RSA, 2-8) or if larger (RSA, 2-12), indicating that in addition to a sheet in the Rancho Santa Ana Botanic Garden Herbarium there have also been sent sets to the herbaria here numbered 2 to 8 or 2 to 12, as the case may be. Other specimens cited are indicated by the abbreviations given below.

1. RSA,—Rancho Santa Ana Botanic Garden Herbarium.
2. DS,—Dudley Herbarium of Stanford University.
3. US,—United States National Herbarium.
4. UC,—University of California Herbarium.
5. CA,—California Academy of Sciences Herbarium.
6. P,—Pomona College Herbarium.
7. UCLA,—University of California at Los Angeles Herbarium.
8. AA,—Arnold Arboretum Herbarium.

(Pages 44-90, issued September 6, 1938.)

8a. Gray,—Gray Herbarium.
9. NY,—New York Botanical Garden Herbarium.
10. MO,—Missouri Botancial Garden Herbarium.
11. J,—Herbarium of W. L. Jepson.
12. SD,—San Diego Museum of Natural History Herbarium.
13. F,—Field Museum of Natural History Herbarium.
14. W,—Herbarium of Louis C. Wheeler.
15. MEY,—Herbarium of Fred G. Meyer.
16. CL,—Herbarium of Ira W. Clokey.
17. DKG,—Herbarium of Doris Kildale Gillespie.
18. SH,—Herbarium of Forrest Shreve.
19. EW,—Herbarium of Joseph A. Ewan.

Other herbaria are occasionally cited by abbreviations that are easily understood.

Notholaena sinuata integerrima Hook. Sp. Fil. **5:** 108. 1864.

Although this fern is well known to the east of California, its presence in California has been noted heretofore only from the Providence Mts. It also occurs as a rare inhabitant of Clark Mt., on the eastern Mojave Desert. COLLECTION: SAN BERNARDINO CO.: 1/4 mi. above Pachalka Spring, in the 1st. canyon to the east, Clark Mt., 5200 ft., May 27, 1935, *C. B. Wolf 7047* (RSA, 2-6).

Pinus edulis Engelm. in Wisliz. Mem. North. Mex. 88. 1848.

In the New York Mts. of San Bernardino Co. two Piñons are common. The one is *Pinus monophylla* Torr. & Frem., with solitary needles. Growing with this is a two-needled Piñon that does not seem to be different from *Pinus edulis* of Arizona. COLLECTIONS: SAN BERNARDINO CO.: near Ivanpah, 4200 ft., April 21, 1932, *R. S. Ferris* & *R. Bacigalupi 8081* (RSA, DS); Keystone Canyon, 5200 ft., July 30, 1937, *C. B. Wolf* & *P. C. Everett 9032* (RSA, 2-8, 9-10).

Abies concolor Lindl. & Gord. Journ. Hort. Soc. Lond. **5:** 210. 1850.

Scattered colonies of the White Fir grow on Clark Mt. in the eastern Mojave Desert of San Bernardino County. The principal stands are located on the steep limestone slopes about 1 mile south of the Coliseum Mine and at elevations of about 6000 feet and above. Trees of this species on Clark Mt. are small, mainly less than 35 feet (6 m.) in height. Nearest known stands in this region seem to be on the Charleston Mts. of Nevada. The presence of White Firs on Clark Mt. is significant in that they definitely place the upper portion of Clark Mt. (main peak 7903 ft. elevation) in the Arid Transition Zone. COLLECTION: Clark Mt., 1 mi. so. of Coliseum Mine at about 6000 ft., May 28, 1935, *C. B. Wolf 7078* (RSA, 2-8, 9-10).

Dichelostemma californicum (Torr.) Wood, Proc. Acad. Philad. **1868:** 173. 1868.

Brodiaea volubilis Baker, Journ. Linn. Soc. 11: 377. 1871.

The Twining Saitas or Twining Brodiaea is a common species of the foothills of the Sierra Nevada and of the Inner North Coast Ranges of California. It is usually found most abundantly in recently burned areas. The twining and somewhat fleshy stems of this species attain lengths of over 4 feet. We have observed that these stems often become entirely separated from the bulb while flowers are still opening. Enough food and moisture are present to enable the capsules to form and mature seeds. This is the only species among brodiaeas in which this phenomenon has been observed, nor is it a particularly common event anywhere in other groups of California native plants. COLLECTION: BUTTE CO.: Sierra Nevada foothills, 2 6/10 mi. east of Bangor, in red clay, May 13, 1937, *C. B. Wolf 8655* (RSA, 2).

Dichelostemma capitatum (Benth.) Wood, Proc. Acad. Philad. **1868:** 173. 1868.

Brodiaea capitata Benth. Pl. Hartw. 399. 1857.

Throughout its range this species displays considerable variation in color, flower size and vegetative aspect. *D. pauciflora* (Torr.) Standley of the Mojave Desert and *Brodiaea insularis* Greene are perhaps too close to *D. capitatum* to merit specific recognition, although distinctive entities. A variant of *D. capitatum* has been collected in southern San Luis Obispo County that warrants additional studies. In this locality a number of plants was observed and collected in which the perianth lobes were abruptly contracted and almost truncate with the central nerve or rib prolonged into a conspicuous mucro or point 2 to 3 mm. long. At the time it was collected no bulbs were taken and it has always been my hope to return to the region at the proper season and determine how extensive this variant is distributed. COLLECTION: SAN LUIS OBISPO CO.: 2 to 3 mi. inland from the ocean and about 3 mi. no. of the Santa Maria River, April 15, 1929, *C. B. Wolf 3565* (RSA).

Nolina Parryi S. Wats. Proc. Amer. Acad. Sci. **14:** 247. 1879.

Magnificent stands of what seems to be this species occur in the Kingston Mts. of eastern San Bernardino County and southern Inyo County. The species appears to be somewhat different from typical *N. Parryi* of the Colorado Desert and cismontane southern California, but I have been unable to detect botanical differences of sufficient importance to warrant its segregation either as a distinct species or subspecies. Nevertheless, its occurence in the Kingston Mts. is of interest from the standpoint of distribution and also because of its large size. When in bloom the individual

plants stand out like huge sentinels and may be seen against the skyline for many miles. In fact, either in flower or fruit, this is one of the most spectacular species of the California deserts. The following measurements are from the collections cited below: total height 16 ft.; trunk diameter 2-3 ft.; length of leaves 5 ft., making a spread of about 12 ft.; fl. stalk about 12 ft. long, 6 in. diam., with fl. portion about 6 ft. long and 42 in. in width. COLLECTIONS: SAN BERNARDINO CO.: Kingston Mts., 2 mi. west of Beck Spring, May 14, 1935, *C. B. Wolf 6790* (RSA, 2-8, 9-11), ½ mi. west of Beck Spring, Oct. 9, 1935, *C. B. Wolf 7655* (RSA, 2-8, 9-15), from seeds collected along with the latter collection (Prop. No. 2419) we have propagated several hundred plants, which will enable us to compare them with other cultivated strains of *N. Parryi*.

Agave deserti Engelm. Trans. Acad. St. Louis **3:** 310. 1875.

This common agave of the western Colorado Desert was reported from the Whipple Mts. and possibly from the Chemeheuvis Mts. (R. S. A. Bot. Gard. Occ. Papers 1: 33. 1935.). One or two old collections of this species are known from the Providence Mts., but are too fragmentary for positive determination. A recent field trip into the Providence Mts. has resulted in obtaining this species in flower. COLLECTION: San Bernardino Co., Providence Mts., ½ mi. above Bonanza King Mine, 5000 ft., July 29, 1937, *C. B. Wolf & P. C. Everett 9023* (RSA, 2-9).

× **Quercus morehus** Kellogg, Proc. Calif. Acad. **2:** 36. 1863.

Q. Kelloggii Newb. × *Q. Wislizenii* A. DC. (Figures 14 & 15)

The Oracle Oak has long been of interest to botanists and other persons interested in California trees because of its supposed hybrid origin. Even as early as 1889 Greene (West Amer. Oaks 3, 47 & 79.) was perplexed by this tree, but in his final discussion (p. 79) concluded that it must be a hybrid between *Q. Kelloggii* and *Q. Wislizenii*. Since then various botanists have been uncertain as to what disposal should be made of this species. Sudworth (Forest Trees of Pac. Slope 311. 1908.) concluded that it was a distinct species. Jepson (Flora of Calif. 1: 362. 1909.) once regarded it as a hybrid between *Q. Kelloggii* and *Q. Wislizenii,* while later (Man. Fl. Pl. Calif. 277. 1923.) gave it specific rank and made no note as to its possible hybrid origin. Abrams (Bull N. Y. Bot. Gard. 6: 345. 1910 & Ill. Fl. Pac. States 1: 517. 1923.) regarded it as a supposed hybrid between *Q. Kelloggii* and *Q. Wislizenii*. Davidson and Moxley (Fl. South. Calif. 98. 1923.) included it as a hybrid of *Q. Kelloggii* and *Q. Wislizenii*. Munz (Man. South. Calif. Bot. 108. 1935.) gave it specific rank, but regarded it as a hybrid between *Q. Kelloggii* and *Q. Wislizenii*. None of these observations was based upon experimental work.

Two experimental methods of ascertaining the nature of *Quercus morehus* are feasible: 1) to make crosses between *Q. Kelloggii* and *Q. Wis-*

lizenii; 2) to grow seedlings of *Q. morehus* and observe the variation and nature of the seedlings. We have followed the latter procedure, since our cultivated trees of the two parents are still too young to produce fruit and because we are not in close enough proximity to wild trees to maintain the careful checks necessary for field hybridization.

During the course of our regular field work we have made a number of collections of *Quercus morehus,* the notes about which would seem to be of some interest. COLLECTIONS: CALIFORNIA: MENDOCINO CO.: Eel River at Eel River F. S. Camp, Upper Sonoran Zone, *C. B. Wolf 9297* (RSA, 2-4), a small tree 12 ft. high, 8 ft. spread, trunk diam, 4 in., growing with *Q. Wislizenii* and *Q. Garryana.* SACRAMENTO CO.: 2 mi. west of north fork of American River, 7 mi. from Auburn, on the road to Folsom, Upper Sonoran Zone, *C. B. Wolf* & *B. D. Stark 5485* (RSA, 2-8, 9-10), tree 30-35 ft. high, 25 ft. spread, trunk diam. 4 ft., Prop. No. 1955 (376 acorns) obtained from this tree in 1933; *C. B. Wolf* & *E. R. Johnson 6146* (RSA, 2-7), the same tree as the preceding, Prop. No. 2113 (10 lbs. of acorns) obtained in 1934; *C. B. Wolf 8341* (RSA, 2-8, 9-14), collected March 30, 1937 from same tree as the preceding. At that date the tree was in full bloom. The old leaves were all shed and the new growth on the branchlets was from 6-18 in. as compared with ½-1 in. of growth on adjacent trees of *Q. Wislizenii.* Seedlings surrounding this Oracle Oak appeared to have been mainly deciduous; from near *5485, C. B. Wolf* & *B. D. Stark 5490* (RSA, 2-4), shrubby, 10 ft. high, 15 ft. spread, trunk diam. 4 in. NEVADA CO.: 4 3/10 mi. east of Smartsville, on the road to Grass Valley, Arid Transition Zone, 1300 ft. elevation, *C. B. Wolf* & *B. D. Stark 5499,* Sept. 25, 1933 (RSA, 2-5), tree 18 ft. high, 10 ft. spread, several trunks 6 in. diam., in association with *Q. Kelloggii* and *Q. Wizlenzii,* only bearing a few acorns; close to *5499, C. B. Wolf* & *B. D. Stark 5500* (RSA, 2-6), tree 30 ft. high, 20 ft. spread, trunk diam. 16 in., Prop. No. 1962 (193 acorns) obtained from this tree. SANTA CRUZ CO.: Santa Cruz Mts., 7/10 mi. east of Bonnie Doon, Arid Transition Zone, 1600 ft. elevation, Sept. 17, 1937, *C. B. Wolf 9363* (RSA, 2-4), Prop. No. 3105 (a few acorns) collected from this, which was only a shrub 15 ft. high, 18 ft. spread, trunks 2-4 in. diam. *Quercus Wislizenii* in scrub form noted nearby. SANTA BARBARA CO.: Buena Vista Grade, interior of Santa Cruz Island, *C. B. Wolf 2759,* March 20, 1932 (RSA, 2-4), tree 20 ft. high, 20 ft. spread, trunk diam. 6 in. *Quercus Wislizenii* (Q. *parvula*) occurs on Santa Cruz Island, but there are no known trees of *Q. Kellogii,* although there may have been when the above tree was produced. SAN BERNARDINO CO.: Lytle Creek, 8/10 mi. above Glenn Ranch, Upper Sonoran Zone, 4000 ft. elevation, *C. B. Wolf 2500,* Oct. 24, 1931 (RSA, DS, UC, P, UCLA), shrubby, 20 ft. high, 20 ft. spread, several trunks 4-6 in. diam., no acorns; head of Swartout Valley, between Lone Pine Canyon and Wrightwood, Arid Transition Zone, 6000 ft. elevation, *C. B. Wolf 4073,* Sept. 14, 1932 (RSA, 2-7), no acorns. This appears to be the same tree

FIGURE 14. **Leaves of Quercus.** a-d, **Kelloggii.** e-h, **Wislizenii.** i-s, **morehus.** a, **Wolf & Stark 5481** (Prop. No. 1951). b, seedling of Prop. No. 1951. c, **Wolf & Stark 5482** (Prop. No. 1952). d, seedling of Prop. No. 1952. e, **E. R. Johnson 1563** (Prop. No. 912). f, seedling of Prop. No. 912. g, **Wolf 1794** (Prop. No. 1050). h, seedling of Prop. No. 1050. i, **Wolf 2477.** j, **Wolf 2500.** k, **Wolf 2759.** l, **Wolf 4073.** m, **Wolf & Stark 5485.** n, **Wolf & Stark 5490.** o, **Wolf & Stark 5499.** p, **Wolf & Stark 5500.** q, **Wolf & Johnson 6146.** r, **Wolf 9297,** s, **Wolf 9363.**

FIGURE 15. **Quercus morehus** seedling leaves from separate plants as grown at the Garden. A1-A10, Prop. No. 1955. B1-B12, Prop. No. 1962. C1-C15, Prop. No. 2113. D, Prop. No. 3105.

cited from this locality by Abrams (Bull. N. Y. Bot. Gard. 6: 345. 1910.); Santa Ana River, ½ mi. above Seven Oaks, Arid Transition Zone, 5200 ft. elevation, *C. B. Wolf 2477,* Oct. 21, 1931 (RSA, DS, UC, P, CA, UCLA), no acorns.

Many additional collections of *Quercus morehus* are to be found in herbaria, but the above pretty well cover the range of the species. All of the above of mature size appear to have produced crops of acorns at various times as evidenced by old acorn cups. These wild trees have every appearance of making more rapid growth than either *Q. Kelloggii* or *Q. Wislizenii,* the latter being an extremely slow growing tree. Most of the trees of *Q. morehus* were found at comparatively low elevations, mainly at the upper limits of the distribution of *Q. Wislizenii,* rather than well up in the areas where *Q. Kelloggii* is abundant, indicating that the crosses are largely from pollen of *Q. Kelloggii.*

The several collections of acorns of *Quercus morehus* which we have obtained (Prop. Nos. 1955, 1962, 2113, 3105) have all produced some seedlings in the nursery, altogether amounting to about 900 young plants. Of these, many were so weak that they only produced a few pairs of leaves and survived only a few months. Others closely resembled seedlings of *Q. Kelloggii* and *Q. Wislizenii,* while a few from nearly every lot were typical *Quercus morehus.* In addition many seedlings were of variable leaf types and could not be regarded as any of the above three types.

Seedlings of Prop. Nos. 1955 & 1962 were planted in regular beds in the Garden, and have now dwindled to 117 trees of which only a few are likely to survive and grow to maturity. All of the seedlings of Prop. No. 2113 were planted in a test plot as soon as they germinated. Of these, six vigorous plants of the typical *Q. morehus* appearance were planted in the Garden in February of 1938 where they have been making vigorous and substantial growth.

Summary and Conclusions

1. The Oracle Oak, although having a widespread distribution in California, is rarely found except as lone trees in regions where *Quercus Wislizenii* and *Q. Kelloggii* occur (except the tree cited from Santa Cruz Island—*C. B. Wolf 2759*).

2. Wild trees of the Oracle Oak appear to grow at a much more rapid rate than either *Q. Wislizenii* or *Q. Kelloggii.*

3. All mature trees of the Oracle Oak seen by us appear to produce fertile acorns more or less regularly.

4. Seedlings beneath wild trees of the Oracle Oak are rarely common, but those seen display much the same variation exhibited by seedlings grown at the Garden.

5. Several lots of acorns of the Oracle Oak, hand-picked in the wild, have been propagated at the Garden. In all instances they have been ex-

tremely variable, many have been weaklings, others resembled *Q. Kelloggii, Q. Wislizenii* or were intermediate, while a few vigorous plants appeared to be typical *Q. morehus.* All of these features are common characteristics of the second generation from a hybrid.

6. Unless a means of propagating *Q. morehus* vegetatively or producing it readily by crossing the parents is found it would appear that the species can not be used to any extent in horticulture, although it is a beautiful, shapely, rapid growing tree.

7. *Quercus morehus* is a natural hybrid between *Quercus Kelloggii* and *Quercus Wislizenii,* most instances of which appear to have arisen as a result of pollen of *Q. Kelloggii* being carried to pistillate flowers of *Q. Wislizenii.* However, we feel that the best way to treat the Oracle Oak is to include it along with other oaks as a species but write the name in the manner customarily used for known hybrids, namely: × *Quercus morehus* Kell.

Atriplex nummularia Lindl. in Mitch. Journ. Trop. Austr. 64. 1848.

Atriplex Johnstonii C. B. Wolf, R. S. A. Bot. Gard. Occ. Papers 1: 3. 1935.

During the latter part of the 19th. century a number of species of *Atriplex* were introduced into California from Australia. Among them was *A. nummularia.* Charles H. Shinn in a paper on the Australian Salt Bushes (U. S. Agric. Exp. Station Bull. 125. May 1899.) wrote as follows concerning *A. nummularia*: "This is one of the first Saltbushes introduced into California, and hopes of its naturalization were long entertained, but it is dioecious, and has never made fertile seed here, ... Seeds obtained from Australia have twice failed to germinate."

At the time that *Atriplex Johnstonii* was described I had seen a few Australian specimens of *A. nummularia,* but concluded that they were not the same as the plants of Playa del Rey, Los Angeles County. Since then I have seen more material and have concluded that *A. Johnstonii* is nothing more than a synonym of *A. nummularia.*

In 1936 I sent Prof. J. M. Black of North Adelaide, South Australia, a specimen of *Atriplex Johnstonii* and asked him to compare it with *A. nummularia* of Australia. His reply stated that he could not detect specific differences between the two, although *A. Johnstonii* had much larger leaves and longer petioles. Prof. Black also sent a small specimen of *A. nummularia* from Maree, South Australia, which substantiates his conclusion.

Despite the fact that *A. Johnstonii* proves to be merely a synonym of *A. nummularia,* it must still be considered a part of the introduced flora of California and may well come to occupy considerable areas along our coast.

Atriplex nummularia is being successfully cultivated at the Southwest

Arboretum, Superior, Arizona, from Australian seeds, specimens of which have been forwarded to Rancho Santa Ana Botanic Garden by Mr. Fred Gibson.

Dianthus prolifer L. Sp. Pl. 410. 1753.

Tunica prolifera Scop. Fl. Carn. ed 2. 1: 300.

This little European plant has established itself in the eastern United States and has been included and figured in such works as Britton and Brown's Flora. We have recently found it in California where it apparently has been established for many years, but has been overlooked by collectors. COLLECTION: YUBA CO.: Sierra Nevada foothills, 2 mi. above Brown's Valley on road to Stanfield Hill, growing in a moist meadow in gravel, elevation 400 ft., May 13, 1937, *C. B. Wolf 8632* (RSA, 2-7, 8a-9).

Umbellularia californica (Hook. & Arn.) Nutt. No. Amer. Sylva **1:** 87. 1842.

Fruits of the California Bay or Laurel have generally been described in manuals and floras dealing with the species as greenish to purplish in color. Purplish or reddish-purplish fruits are probably the most common throughout the range of the California Bay, as for example: at the Marin Dell School, 5 mi. no. of San Rafael, Marin Co., Oct. 18, 1934, *C. B. Wolf & E. R. Johnson 6199* (RSA, 2-6). I can find no reference to yellowish fruits on the California Bay, yet in many areas they are the common type, as for example: Cold Spring Camp, San Marcos Pass road, Santa Ynez Mts., Santa Barbara Co., Dec. 8, 1937, *P. C. Everett 9384* (RSA).

THE MATILIJA-POPPIES

(Figures 16 & 17)

Principal differences ordinarily noted between *Romneya Coulteri* Harv. and *R. trichocalyx* Eastw. (*R. Coulteri* var. *trichocalyx* Jepson) have been the glabrous and beaked calyx lobes of the former in contrast to the setose and nearly beakless calyx lobes of the latter. There are a number of other distinctive characters between the two plants by which we have learned to distinguish specimens and living plants of the two, even when no sepals are available. Many herbarium sheets of *Romneya* are deficient in that only the inflorescence was collected. Where ample material of the basal parts of the plants has been taken or where the plants can be studied in the field the vegetative features of the two species are plainly evident. *R. Coulteri* has thick leafy stems with numerous flowers borne on rather long pedicels, whereas, in *R. trichocalyx* the stems are slender, less leafy and the fewer flowers are congested on shorter pedicels. Lower and many of the upper leaves of *R. Coulteri* are comparatively thick, large, and have rather broad divisions. In *R. trichocalyx* the leaves are thinner, usually somewhat smaller, and the divisions are much narrower. A leaf of *R. trichocalyx*

from a comparable part of the stem generally averages less than one-half as much surface as one from *R. Coulteri,* even when the length and breadth are about the same. Another feature which appears to be rather constant and which is of help in the determination of herbarium specimens or living plants on which no sepals are present is that in *R. trichocalyx* there are a few setose bristles on the pedicels just beneath the capsule, whereas, they are absent in *R. Coulteri.*

Distribution of *R. trichocalyx* has generally been given as "with the species" in works where it has been treated as a variety of *R. Coulteri.* Our observations are that *R. trichocalyx* is the abundant Matilija-Poppy in the mountains of San Diego Co. It also occurs in Ventura Co. *R. trichocalyx* has not been noted by us in the Santa Ana Mts., but *R. Coulteri* is abundant and there are probably more individuals than in all of the rest of southern California.

As a horticultural subject for outdoor planting and mass display *R. Coulteri* with its heavy, vigorous, leafy stems and numerous large clusters of flowers is by far superior to *R. trichocalyx.* But as a cut flower the latter is preferable, since the slender stems with their 3-5 closely clustered flowers are far more graceful.

DENDROMECON ON THE CHANNEL ISLANDS, CALIFORNIA

Most of the recent manuals and floras of California have regarded all of the island material of the Bush Poppy as *D. Harfordii* Kell. (Proc. Calif. Acad. Sci. 5: 102. 1873.) or *D. rigida Harfordii* (Kell.) K. Bdge. (Zoe 4: 83. 1893.), and have ignored *D. arborea* and *D. rhamnoides,* both proposed by Greene (Pittonia 5: 305. 1905.).

D. Harfordii was described from material from Santa Rosa Island, but is also scattered over Santa Cruz Island. It differs from the mainland *D. rigida* Benth. in having larger flowers and broadly elliptic to oval leaves, usually rounded at the apex, with only a slight mucro or point or absent. EXAMPLES: SANTA CRUZ ISLAND: east of Buena Vista summit, *C. B. Wolf 2823* (RSA, 2-3); main ridge south of South Ranch, *C. B. Wolf 4128* (RSA, 2).

D. rhamnoides Greene and *D. arborea* appear to me to be essentially alike; the former was based on material from San Clemente Island, while the latter was based on specimens from Santa Catalina Island. Both names were proposed at the same time, but *D. rhamnoides* was treated first, so is considered the prior name. *D. rhamnoides* differs from the mainland *D. rigida* in its much larger flowers and in its extremely large leaves. From *D. Harfordii* it is distinct in having much larger leaves which are broadly elliptical but more nearly acute than obtuse and with a conspicuous mucronation. EXAMPLES: SANTA CATALINA ISLAND: Black Jack Mine, on slopes of Black Jack Peak, *C. B. Wolf 4227* (RSA, 2-8, 9-11), and *C. B. Wolf 4228* (RSA, 2-8).

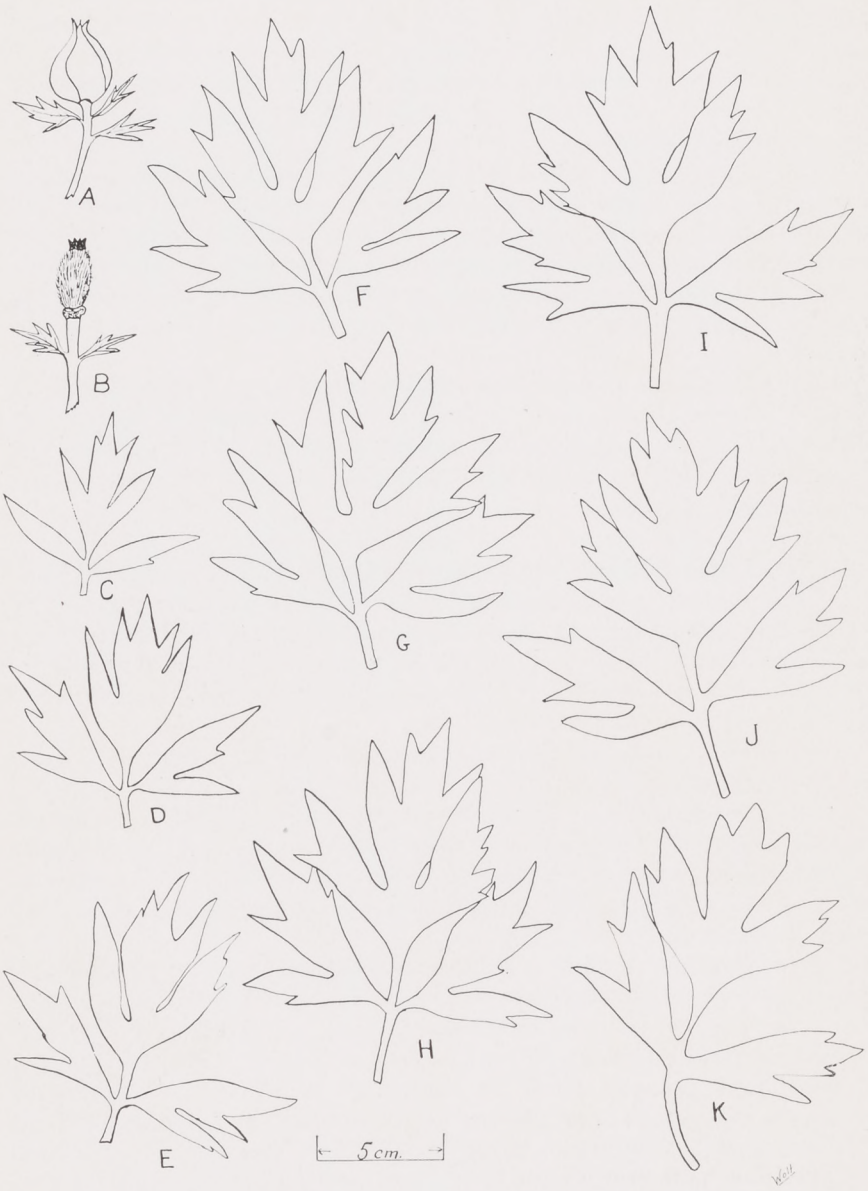

FIGURE 16. Romneya Coulteri. a, flower bud showing beaked calyx. b, immature capsule. c-k, leaves from a typical branch about 2 meters long. c, 1st leaf below inflorescence. d, 5th leaf. e, 10th leaf. f, 15th leaf. g, 20th leaf. h, 25th leaf. i, 30th leaf. j, 35th leaf. k, 40th leaf. Drawn from cultivated material in the Garden obtained from the Santa Ana Mts., Orange Co., Calif.

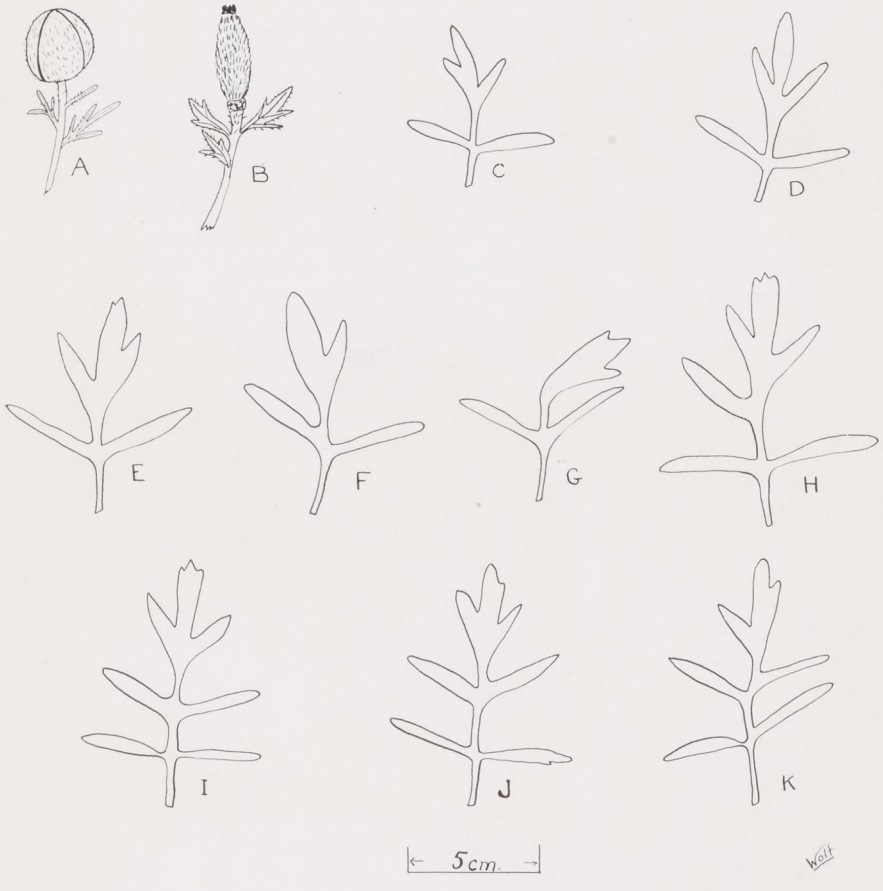

FIGURE 17. Romneya trichocalyx. a, flower bud showing beakless and setose calxy, also bristles on pedicel. b, immature capsule with bristles on pedicel. c-k, leaves from a typical branch about 2 meters long. c, 1st leaf below inflorescence. d, 5th leaf. e, 10th leaf. f, 15th leaf. g, 20th leaf. h, 25th leaf. i, 30th leaf. j, 35th leaf. k, 40th leaf. Drawn from cultivated material in the Garden grown from seed from Cottonwood Creek, San Diego Co., Calif.

We have grown several strains of the mainland *D. rigida,* also *D. Harfordii* from Santa Cruz Island, and *D. rhamnoides* from Santa Catalina Island. The three forms retain their distinctive characteristics, but from an horticultural standpoint *D. rhamnoides* is the best.

How best to treat these three entities is a problem, but our observations lead us to believe that it is unsatisfactory to include all the insular forms under *D. Harfordii.* However, like many of Greene's revisions the numerous species proposed by him in *Dendromecon* for the mainland also need evaluation and thorough revision.

THE TEJON RANCH ESCHSCHOLTZIA

Words fail to describe the splendor and dazzling effects created by the wild flowers of the Bakersfield area when viewed at the height of their blooming period in a season of sufficient and properly spaced rains. Such a year was 1935 and we journeyed to the Tejon Ranch in the middle of April to view the display and to make collections. We had arrived after dark and camped a few miles east of Rose Station, in what we could see, even by lights of the car, was the greatest mass show in the area in many years. The next morning as the day broke the far hills of Wheeler Ridge were lighted as if by a gigantic spotlight and masses of yellow and orange many miles in extent were emphasized. Then as the sun climbed over Bear Mt. to the east, the valley at the foot of the Grapevine became a dazzling combination of yellow, blue and purple. A little later the hills to the east of the Tejon Ranch began to blaze with colors as brilliant as those areas on the valley floor. Miles of the round-topped foothills to the north of the Tejon Ranch headquarters gave forth a brilliant, deep orange color, at times nearly red, but deeper than anything to be seen on the valley floor. About 2 miles northwest of the Tejon Ranch headquarters we found a service road leading back upon the hills and which soon brought us into the midst of the blocks of brilliant deep orange. It proved to be an *Eschscholtzia,* but what an *Eschscholtzia!* Growing in heavy adobe soil were literally millions of plants, many of which were over 1½ feet high. The deep orange-reddish petals measured well over 1½ inches long. Lack of a torus rim and the annual nature of the plant places it in the *E. caespitosa* group and it is probably closest to *E. caespitosa hypecoides,* but no known description of that entity accurately includes it. COLLECTIONS: KERN CO.: 2 mi. northwest of Tejon Ranch headquarters, April 15, 1935, *C. B. Wolf 6358* (RSA, 2-7, 8a-12), and May 6, 1935, *C. B. Wolf 6738* (RSA, 2-6).

With some diligence I searched through Dr. Greene's almost innumerable species in his revision of *Eschscholtzia* (Pittonia 5: 205-293. 1905.), but apparently the Tejon Ranch *Eschscholtzia* was not in his hands.

Later in 1935 we obtained seed of the Tejon Ranch *Eschscholtzia* and have since been growing it along with many other strains of *Eschscholtzia* in our wild flower fields. It is the earliest of all to bloom, but has never at-

tained quite the size nor deepness of color evident on Tejon Ranch in 1935. It is, however, the deepest colored of any form we have.

It is with some hesitation that I suggest that this Tejon Ranch *Eschscholtzia* has not been named and also that its botanical features place it beyond the limits set for *E. caespitosa hypecoides*. I have pointed it out at this time so that botanists and wild flower lovers will seek it out and study it. In the meantime we are assembling field notes and herbarium specimens of *Eschscholtzia* and growing many strains in the hope of eventually determining the approximate number of races, entities, strains or species that actually occur in California. A number which we think will be somewhat greater than generally recognized in the manuals of California botany, but considerably less than the number proposed by Greene.

THE CALIFORNIA ARGEMONES

Although most manuals and floras dealing with California botany have recognized three entities in *Argemone*, the descriptions and keys have appeared to me to be confusing in use in that too much reliance has been placed on the type of inflorescence (*corymbose or not corymbose*), the relative spininess of the calyx (*densely spiny or sparsely spiny*), and on the size and nature of the horn-like appendages of the sepals (*either very conpicuous, with a stout terminal and several basal spines, or inconspicuous and with only a terminal spine*). These features, although possibly of fundamental importance when the entire genus is considered, appear to be much less reliable for distinguishing the California material than certain other characters which are more easily recognized and which are much more in evidence on most herbarium specimens. *A. corymbosa* seems to have been particularly misunderstood, as evidenced by the numerous specimens of *A. platyceras* and *A. platyceras hispida* which have been determined as that species by collectors. On the other hand *A. platyceras* and *A. platyceras hispida* merge in their characters and distribution so that they cannot be maintained as distinct species, although well-marked in many areas.

DIAGNOSTIC KEY TO THE CALIFORNIA SPECIES OF ARGEMONE

Leaves sinuate-margined, rarely shallowly pinnatifid, oblong to obovate, usually very blunt or rounded at the tips, sparsely spiny on the margins and beneath, mainly spineless above; seeds 1.5 mm. in diam. . . . . 1. *A. corymbosa*

Leaves irregularly pinnatifid, often cut nearly to the midrib, the lobes in turn often secondarily somewhat irregularly divided or toothed, sparsely to densely spiny and hispid on both surfaces; seeds 2-2.5 mm. in diam.

Stems and leaves spiny but not hispid, the epidermal surfaces often glaucous, not obscured by the spines; leaves largely

spineless above and only spiny along midrib and principal veins beneath . . . . . 2. *A. platyceras*

Stems and leaves hispid more or less throughout, also often spiny, the epidermal surfaces usually dull, obscured by the spines and hairs; leaves largely spiny and hispid above as well as beneath . . . . . 2a. *A. platyceras hispida*

1. Argemone corymbosa Greene, Bull. Cal. Acad. **2:** 59. 1886.

A. intermedia var. *corymbosa* (Greene) Eastw. Erythea 4: 96. 1896.

The type of this species was collected on the Mojave Desert by M. K. Curran in June of 1884 (there is a fragment at UC, sheet no. 126416). In 1917 she returned to the Mojave and again collected the species at Kelso, which I believe was her original station. *A. corymbosa* has been generally regarded by California botanists as a variety of *A. intermedia* Sweet, Hort. Brit. ed. 2: 585. 1830, but that species is from Mexico and I question whether our plants should be referred to that entity which has sinuate-pinnatifid leaves.

A. corymbosa is a much more delicate plant than either of our other two entities and differs from them in several easily discerned features. It is characteristically slender in growth, has small flowers, and seeds ranging in size from 1 to 1.5 mm. in diameter. The obovate, rarely more than sinuate-margined leaves make it easy to segregate it from the two following. In the past the sparsely spiny calyx and small horns to the tips of the sepals have been deemed important along with a corymbose inflorescence, but these features appear to me to be unreliable since similar appearing flower buds are to be found also in *A. platyceras.*

A. corymbosa is known in California only from a limited area of the Mojave Desert and has only been collected a few times, whereas the two other entities have been frequently taken and are widespread in distribution. No specimens have been seen which appear to be intermediate between *A. corymbosa* and the following two entities.

Specimens Examined. CALIFORNIA: SAN BERNARDINO CO.: Kelso, *M. K. Curran,* June 1884 (UC, fragment of type), *K. Brandegee,* May & June 1917 (DS, UC, CA, P), *M. E. Jones,* May 2, 1906 (DS, P); 1 mi. east of Pisgah, *C. B. Wolf 8544* (RSA, 2-6), *C. B. Wolf* & *E. R. Johnson 8766* (RSA, 2-5); near Lavic, *Munz, Harwood* & *Johnston 4293* (P); Silver Lake, *S. B. Parish 9863* (DS), *10372* (DS); Nipton, *K. Brandegee,* June 1915 (UC), *M. E. Jones,* May 2, 1907 (P); Black's Ranch, southeast of Fremont Pk., *Hall* & *Chandler 6848* (UC, sheet no. 126672). Accompanying this sheet is the following note which I believe is in the handwriting of H. M. Hall: "6848, common, height 3 ft. and under: fls. dull white, very fragrant with odor of carnations—only 2 specimens taken, both from same

spot—sand hummocks in dry bed of alkali lake." Attached to the specimen is a photograph, which is very obviously not *A. corymbosa,* since the leaves are deeply pinnatifid and the flowers are too large. The vigorous growth of the plant in the picture suggests *A. platyceras hispida,* but it may well be either *A. platyceras* or an intermediate form. The plant in the photograph is surrounded by coarse, rocky soil which does not appear to be the alkali lake bed mentioned by Hall & Chandler. It may have been a plant on the adjacent mesas or even from a different region entirely. Figure 116, Jepson, Flora Calif. 1: opposite page 560. 1922, was apparently made from this above photograph or from a duplicate of it, and should be corrected to read: A form of *A. platyceras* Link & Otto.

2. Argemone platyceras Link & Otto, Ic. Pl. Rar. 185. *t. 43.* 1828.

The type of this species was obtained in Mexico and, as the species is now usually delimited, includes material of Texas, New Mexico and Arizona as well. I am not very familiar with the species in the field in Mexico, but have seen and collected it in New Mexico and Arizona where it is often very abundant on lands that have been over-grazed. Our California material that has passed for *A. platyceras* appears to me to differ in general appearance from that of New Mexico, Arizona and northern Sonora and is perhaps not really the *A. platyceras* of Mexico. In California *A. platyceras* is essentially a coast range species. It is a tall, vigorous plant, often abundant along firebreaks and disturbed roadsides and has a distribution mainly distinct from that of either of the other two California entities. The stems and leaves are beset with stiff spines, but are devoid of the hispid bristles characteristic of *A. platyceras hispida.* Foliage of *A. platyceras* is characteristically glaucous.

Specimens Examined. CALIFORNIA: TRINITY CO.: The Knob, near Deer Lick Springs, *L. B. Kildale,* July 7, 1931 (DS), possibly introduced. STANISLAUS CO.: Adobe Valley, *A. D. E. Elmer 5092* (DS); Junto del Puerto Cañon, *Chester Dudley,* in 1935 (CA). SANTA BARBARA CO.: valley of the Sisquoc River, *M. S. Baker,* July 1895 (UC); Sisquoc River, near Santa Maria, *Gertrude Sinsheimer,* Sept. 1927 (CA); Cuyama Green Cañon, *A. Eastwood,* May 6, 1896 (CA). KERN CO.: San Emigdio Cañon, *J. B. Davy 2087* (UC); vicinity of Ft. Tejon, *Abrams & McGregor 279* (DS). VENTURA CO.: Upper Sespe Creek, *P. A. Munz 13233* (UC, P); south side of Mt. Piños, *H. M. Hall 6504* (UC). INYO CO.: Surprise Canyon, *S. B. Parish 10078* (DS), *C. B. Wolf & E. R. Johnson 8763* (RSA, 2). LOS ANGELES CO.: Malibou, *J. H. Barber,* Aug. 5, 1898 (UC); Roscoe, *A. Eastwood 26e* (CA); San Gabriel Cañon, *G. B. Grant,* June 25, 1902 (DS); Acton, *A. D. E. Elmer 3721* (DS, P). SAN BERNARDINO CO.: near Bagdad, *T. S. Brandegee,* May 20, 1902 (UC); foothills

of San Bernardino Mts., *S. B. & W. F. Parish 128* (DS); Fawnskin, *H. P. Chandler,* July 30, 1897 (UC); between Green and Holcomb Valleys, *Shaw & Illingsworth 216* (DS); Big Meadows, *Munz & Johnston 8647* (P); Clark's *M. E. Jones,* July 19, 1900 (P); head of Clark's Grade, *P. A. Munz 10583* (UC, P). ORANGE CO.: Santa Ana Mts., summit of Santiago Pk., *C. B. Wolf 5403* (RSA, 2-5), *9382* (RSA, 2-5). RIVERSIDE CO.: Glen Ivy trail to Santiago Pk., Santa Ana Mts., *Munz & Keck 7083* (P); near Kenworthy, *M. F. Spencer 2181* (P); San Jacinto Valley, *G. F. Reinhardt,* June 1897 (UC); foot of Idyllwild Grade, *C. V. Meyer 208* (UC); Palm Springs, *A. Eastwood 3109* (CA); Saboba Hot Springs, *E. C. Jaeger 1185* (P); San Jacinto, *Street & Durant,* May 12, 1918 (P); Chuckawalla Mts., *H. M. Hall 5970* (UC); Hayfields, Chuckawalla Valley, *Munz & Keck 4925* (P); San DIEGO CO.: San Felipe, *T. S. Brandegee,* April 30, 1894 (UC); Laguna Mts., *T. S. Brandegee,* June 20, 1904 (UC), *Epling et al.,* June 21, 1932 (UC); Hell Hole Canyon, *Epling & Robinson,* April 1932 (DS); below Montezuma Valley, *E. C. Jaeger,* Dec. 1, 1925 (P); Potrero, *S. G. Stokes,* July 14, 1895 (DS); Cottonwood Valley, *L. R. Abrams 3548* (DS); between Jacumba & Buckman Springs, *E. H. Campbell,* May 1921 (CA); Jacumba, *E. A. McGregor 129* (DS); 4 mi. west of Jacumba, *C. B. Wolf 2276* (RSA, DS, CA). IMPERIAL CO.: Split Mt., *T. S. Brandegee,* April 1905 (UC); Beal's Well, *P. A. Munz 11940* (UC, P), *E. C. Jaeger,* Dec. 23, 1925 (P); near Beal's Well, *C. B. Wolf 1876* (RSA, DS, UC).

2a. Argemone playtyceras hispida (Gray) Prain, Journ. Bot. **33:** 367. 1895.

A. hispida Gray, Mem. Amer. Acad. ser. 2, 4: 5. 1849.

A. munita Dur. & Hilg. Journ. Acad. Philad. ser. 2, 3: 37. 1855.

The type locality of *A. hispida* is Santa Fe, New Mexico, based on *Fendler 16* (in part). Most California botanists have regarded this plant as a variety of *A. platyceras* and it is certainly close to that entity, but differs in a number of features. *A. munita* Dur. & Hilg. is perhaps a better name for our material if it were to be regarded as a distinct species, since our California material differs somewhat from that of New Mexico.

In California *hispida* is characteristically a plant of the arid interior and is best developed on the east slopes of the Sierra Nevada, where in recent years it has become increasingly abundant, apparently due to overgrazing by sheep. Plants of *hispida* differ in general appearance from *platyceras* in that they are usually more robust and denser, the leaves are more abundant, thicker, and usually less deeply pinnatifid. Leaf surfaces are mainly hidden by the abundant, hispid bristles and are dull in color, rather than glaucous as in *A. platyceras.*

Specimens Examined. CALIFORNIA: SHASTA CO.: Hat Creek Valley, near Cassel, *E. I. Applegate 5867* (RSA, DS); near Hat Creek,

M. S. Baker 391 (UC); Pit River Canyon, *A. Eastwood 1055* (CA). LASSEN CO.: Milford, *M. S. Baker,* in 1890 (UC); Reno to Amedee, *M. H. Manning,* Sept. 1, 1902 (UC); Honey Lake, *J. T. Howell 638* (CA); hills north of Susanville, *E. I. Applegate 3345* (RSA, DS); Doyle, *P. Monnett,* July 1913 (CA), flowers said to be yellow. PLUMAS CO.: Mohawk, *T. V. Raphael,* Aug. 8, 1917 (CA); east of Beckwith, *H. A. Barker 808* (RSA). SIERRA CO.: Loyalton, *A. Eastwood 7825* (CA). ALPINE CO.: Markleeville, *L. S. Rose,* July 17, 1930 (CA). MONO CO.: Leevining Grade *Heusi* & *Walker 210* (RSA); foot of Bloody Canyon, *Chesnut* & *Drew,* July 20, 1889 (UC); 9 mi. northwest of Bridgeport, *C. B. Wolf 5319* (RSA, 2-7); Mono Lake, *E. Wright,* July 1917 (CA), *J. Clausen 806* (DS), *M. Shaw,* Aug. 30, 1914 (P), *M. E. Jones 24933* (P), *J. Price,* July 28, 1927 (DS), *J. W. Congdon,* Aug. 18, 1894 (DS); Lundy, *M. Minthorn,* Sept. 1908 (UC); Mono Pass, *F. P. McLean,* July 1875 (UC); 20 miles from Round Valley, *R. S. Ferris 1404* (DS); near Mono Craters, *R. S. Ferris 6799* (DS). INYO CO.: hills west of Big Pine, *A. A. Heller 8258* (DS, CA); Cottonwood Creek, *C. B. Wolf 3244* (RSA, DS, CA); Onion Valley, *R. S. Ferris 9014* (DS, UC); near Independence, *M. L. Campbell,* July 1916 (CA); Surprise Canyon, Panamint Mts., *J. T. Howell 4001* (CA). TULARE CO.: Kern Flats, *Culbertson 4556* (P). KERN CO.: near Onyx, *L. R. Abrams 11941* (DS, P); 5 mi. west of Tehachapi, *C. B. Wolf 1679* (RSA, DS, P), *2189* (RSA, DS); Cottonwood Creek, *L. R. Abrams 5334* (DS); vicinity of Bisses Station, *W. R. Dudley 432* (DS); Caliente Creek, *K. Brandegee* (UC); Kernville, *T. S. Brandegee,* May 13, 1891 (UC).

Intermediates between A. platyceras and A. platyceras hispida.

In the mountains of San Diego, Riverside and Orange Cos. the plants cited as *A. platyceras* are comparatively uniform in their characters and well isolated from either *A. platyceras hispida* or intermediate forms. Similarly the specimens of *A. platyceras hispida* from the east side of the Sierra Nevada are remarkably uniform and are also well isolated geographically. However, in other areas the distinctions between the two break down almost entirely, although many specimens cited below closely resemble one or the other of the two, rather than being strictly intermediate in their characters.

Specimens Examined. CALIFORNIA: LAKE CO.: Gravelly Valley, *W. L. Jepson,* July-Aug. 1892 (UC). COLUSA CO.: above Fout's Springs, *Rattan Herb.,* in 1884 (DS); Stonyford, *R. S. Ferris 6455* (DS). SAN BENITO CO.: Hernandez, *W. R. Dudley,* June 3, 1899 (DS), *L. M. Lathrop,* Aug. 20, 1902 (DS); New Idria, *W. H. Brewer 768* (UC); San Benito, *A. Eastwood 6926* (CA). INYO CO.: canyon near Darwin Falls, *R. S. Ferris 7416* (DS, P). KERN CO.: Rosamond, *E. R. Weston,* April 1926 (CA). LOS ANGELES CO.: between Castaic and Sandbergs, *C. B. Wolf*

2184 (RSA, 2-3); San Francisquito Canyon, *F. A. McFadden,* April 22, 1931 (UC); Saugus, *J. H. Barber 172* (UC); near Neenach, *Dudley & Lamb 4374* (DS); 4 mi. west Manzana, *A. D. Gifford 711* (UC); San Antonio Canyon, *H. Webster* (P). SAN BERNARDINO CO.: Lytle Creek, *H. M. Hall 1428* (UC), *L. R. Abrams 1922* (DS, P), *L. R. Abrams 2692* (DS, P); summit of Cajon Pass, *C. B. Wolf 14* (RSA); head of Sheep Creek, *P. A. Munz 4571* (P); Swartout Canyon, *G. R. Hall,* Sept. 1904 (UC); Mill Creek Falls, *S. B. Parish 5092* (DS); vicinity of San Bernardino, *S. B. Parish 4784* (DS); San Bernardino Mts., *E. C. Van Dyke,* June 1928 (CA); Hesperia, *M. F. Spencer 420* (P); Victorville, *S. B. Parish 10598* (DS); Big Meadows, *J. B. Feudge 1657* (P). RIVERSIDE CO.: 3/4 mi. west of Utopia, *C. B. Wolf 3038* (RSA, 2-5).

Brassica alba (L.) Boiss. Voy. Espagne **2:** 39. 1839.

Unlike several other species of mustard, *B. alba* has never become abundant in California. Jepson's Manual gives it only incidental mention. Munz's Manual includes it on a specimen from Santa Monica, probably by *H. E. Hasse,* March 1890 (DS). It is rather surprising that the species has never spread, since it has been used for cover crops and has also been grown for seed. We report it here from two localities in southern California where it seems to have sparingly established itself as a result of its use in citrus groves as a cover crop. COLLECTIONS: RIVERSIDE CO.: 4 mi. w. of Riverside and so. of Jurupa Road, April 21, 1936, *C. B. Wolf 7769* (RSA, 2-7, 8a-10). LOS ANGELES CO.: east of Whittier on Whittier Blvd., near Michigan Ave., May 10, 1936, *C. B. Wolf 7783* (RSA, 2-7, 8a).

While on the subject of the introduced mustards, it is of interest to mention that Trieste Mustard (*B. juncea* (L.) Cosson.) has been used in recent years very extensively by the U. S. Forest Service on burns and more recently by citrus growers as a cover crop. Its advantages over some of the other species, especially as a cover crop, is that it early covers the land, preventing erosion.

It is now being used extensively as a cover crop in Orange County and is spreading spontaneously. Since its introduction as a cover crop we have noted a decrease in the abundance of *B. campestris* L., which was formerly used extensively. Thus we have an example of one introduced plant tending to drive out another.

Crossosoma Nutt.

The habits of the two California species of *Crossosoma* (*C. californicum* Nutt. Journ. Acad. Philad. II. 1: 50. 1848. and *C. Bigelovii* S. Wats. Proc. Amer. Acad. 11: 122. 1876.) are apparently unknown to authors of manuals of California botany, or at least have not been pointed out in their descriptions. Both species are well marked in their botanical features and are hardly to be confused. They are alike in the deciduous nature of their foliage.

During the spring and well along into the summer they retain their leaves. *C. californicum* is a handsome gray-green shrub under cultivated conditions. During the dry months of summer and early fall, the leaves dry up and are largely shed. Shortly after the first rains the plants again leaf out. In 1932 I collected extensively on Santa Catalina Island, where *C. californicum* is an abundant shrub. In May these plants were exceptionally attractive. I returned in September to find them strictly dormant, with many leaves shed, but others merely dried on the plants. At Rancho Santa Ana Botanic Garden the species has the same summer dormant period. We have not grown *C. Bigelovii* so extensively, but it is also similarly dormant during the dry season under cultivation and in the wild.

Holodiscus Maxim.

In the Kingston Range, San Bernardino Co., at the head of the large canyon to the southwest of Horse Spring, at elevations of 5300-5500 ft. are found large stands of *Holodiscus* in which the plants grow to heights of 6 ft. (2 m.) and which we have been unable to assign to *H. dumosus* (Nutt.) Heller as it is known to us from the mountains of southern California. It is possible that the plants are representatives of one of the Great Basin or Arizona entities, but one needs to critically study and perhaps revise the entire genus to determine the status of the above plants. However, it seems worthwhile to record the occurence of the genus in the Kingston Range. COLLECTIONS: SAN BERNARDINO CO.: Kingston Range, canyon to southwest of Horse Spring, Oct. 9, 1935, *C. B. Wolf 7644* (RSA, 2-8, 9-13), and *C. B. Wolf 7649* (RSA, 2-8, 9-11).

Another record of interest is that typical *H. dumosus* is found in the Santa Ana Mts., on Santiago and Modjeska Peaks, from elevations of 5000 ft. to their summits. COLLECTIONS: ORANGE CO.: slopes of Modjeska Pk., 5000 ft., Nov. 3, 1933, *C. B. Wolf* & *E. R. Johnson 5527* (RSA, 2-4); summit of Santiago Pk., 5600 ft., Aug. 24, 1933, *C. B. Wolf 5390* (RSA, 2-5), also June 19, 1935, *P. C. Everett 7221* (RSA, 2-7).

Prunus ilicifolia (Nutt.) Walp. Rep. **2:** 10. 1843.

The Holly-leaved Cherry of California ordinarily bears fruits which, when mature, are reddish-purple, in contrast to those of the Catalina Cherry (*Prunus Lyoni* (Eastw.) Sarg.) which are deep purplish-black. Occasional plants are found in the wild on which the mature fruits are clear, bright yellow, with no suggestion of reddish-purple. Such individuals seem to represent a condition essentially the same as albino forms of flowers found occasionally in many species. COLLECTION: LOS ANGELES CO.: Placerita Canyon, 1 mi. east of Newhall, 1300 ft., Oct. 19, 1937, *C. B. Wolf* & *P. C. Everett 9376* (RSA, 2-8, 9-10).

Parkinsonia aculeata L. Sp. Pl. 375. 1753.

This species is a widely planted small tree in Imperial Valley and is

establishing itself in waste lands along the New River near El Centro, where it was observed by us in January of 1938.

Lupinus luteolus Kellogg, Proc. Calif. Acad. Sci. **5:** 38. 1873.

This late summer annual is a common species in many parts of northern California and there often attains shrub-like proportions. It has heretofore been known only as far south as the vicinity of Hernandez, upper San Benito River, San Benito County. It has recently been found locally abundant on Mt. Piños, in Ventura County. COLLECTION: 6/10 mi. above site of Stauffer P. O., Mt. Piños, Ventura Co., Sept. 2, 1937, *C. B. Wolf 9280* (RSA, 2-7, 8a-11).

Petalostemum Searlsiae Gray, Proc. Amer. Acad. **8:** 380. 1873.

This species has been reported for California from the Pahrump Valley (*Jaeger*) and Providence Mts. (*Brandegee*). In addition to these localities the species has also been collected in the Waucoba Pass, Inyo Co. (*J. & H. Grinnell 1025A,* UC); at Barnwell, New York Mts., San Bernardino Co. (*K. Brandegee,* May 1911, UC). We have also found the species in the New York Mts. in Keystone Canyon at about 5500 ft. where it was scattered in the canyon bottom in decomposed granite and limestone. COLLECTION: *C. B. Wolf & P. C. Everett 9029* (RSA), no duplicates were collected because the flowers and fruits were nearly gone at the time (July 30, 1937).

Astragalus Brauntonii Parish, Bull. So. Calif. Acad. **2:** 26. 1903.

A recent note by Munz (Leafl. West. Bot. *2*: 69. 1938.) reports this species from the mountains above Santa Monica. This station is near the type locality and is important since the species is represented by so few collections. Two additional stations are known to us. COLLECTIONS: LOS ANGELES CO.: Monrovia, *Ernest Braunton 1006* (RSA, UC). ORANGE CO.: slopes of Sierra Peak, Santa Ana Mts., *B. D. Stark 4997* (RSA, 2-3), *C. B. Wolf 8000* (RSA, 2-7, 8a & 9), *Everett & Johnson 9381* (RSA). In the Santa Ana Mts. the species is an inhabitant of sterile sandstone ledges, has stout, somewhat woody stems and plants appear to persist for many years.

Linum puberulum (Engelm.) Heller, Pl. World **1:** 22. 1897.

This species was included for southern California in Munz's Manual (1935) upon a specimen collected 30 miles east of Baker by M. F. Gilman. It also grows in the New York Mts., in Keystone Canyon, near Keystone Spring, 5500 ft. COLLECTION: July 30, 1937, *C. B. Wolf & P. C. Everett 9031* (RSA, 2).

Mortonia utahensis (Coville) A. Nelson, Bot. Gaz. **47:** 427. 1909.

This species was recently included in the flora of southern California (Munz, Manual of South. Calif. Botany 295. 1935.) based upon a collection by *Jaeger,* in 1934, from Kingston. The species is known from several localities in the eastern Mojave Desert, and *Jaeger's* Kingston locality must certainly refer to about the first locality cited below, for Kingston is in the center of an alkaline valley, whereas this species is a shrub of rocky slopes and high washes. COLLECTIONS: SAN BERNARDINO CO.: southern end of Kingston Mts., northeast base of pass between Kingston and Francis Spring, 3500 ft., May 15, 1935, *C. B. Wolf 6856* (RSA, 2-8, 9-10); Clark Mt., 1/3 mi. above Pachalka Spring, in 1st. canyon to east, 5300 ft., May 27, 1935, *C. B. Wolf 7049* (RSA, 2-8, 9-12), also Oct. 5, 1935, *C. B. Wolf 7591* (RSA, 2-8); near Kingston, *E. C. Jaeger,* March 25, 1934 (P). INYO CO.: Falls Canyon, Grapevine Mts., *M. F. Gilman 2178* (P).

Ceanothus papillosus Torr. & Gray, Fl. No. Amer. **1:** 268. 1838.

This species has been reported from Holy Jim Cañon, Santa Ana Mts., upon a collection by *F. W. Peirson 3492.* It is not confined to that locality, but is rather widespread in the range and inhabits the higher ridges along the main divide, extending north to within a few miles of Sierra Peak. COLLECTION: ORANGE CO.: Santa Ana Mts., 2 mi. so. of summit of Skyline Drive, along road to Santiago Pk., 4000 ft., Jan. 5, 1933, *B. D. Stark 4504* (RSA). Small plants were obtained at the same time (Prop. No. 1754) and have been growing at the Garden since that time.

Eremalche kernensis C. B. Wolf, sp. nov. (Figure 18)

Erect or prostrate annual, the stems 10-15 cm. long. Herbage green, with scattered stellate hairs. Petioles 15-40 mm. long; blades 10-30 mm. long, cut into 3-5 main divisions, these in turn bearing 1—several crenate lobes. Hairs on stems about .3 mm. long, 3-8-rayed; those on leaves slightly shorter, mainly 3-5-rayed. Flowers solitary in the upper leaf axils on pedicels 10-25 mm. long, or congested at the tips of the branchlets. Bractlets 2-3, filiform, 3-4 mm. long. Calyx lobes 8-10 mm. long, 2-3 mm. wide, tapering gradually to a slender tip. Hairs of inflorescence 5-8-rayed, more numerous than on stems and leaves. Petals 10-13 mm. long, 6-7 mm. wide, obovate, truncate or rounded at apex, creamy white to very pale lavender. Stamens and styles numerous. Carpels 8-13, grayish or very light brown, transversely corrugated on back, 2 mm. long. Seeds curved, light brown, 1.5-2 mm. long.

Annua, erecta vel prostrata, appressimo stellato tomento. Caulibus 10-15 cm. longis. Foliis 3-5 partibus, 10-30 mm. longis. Bracteolis 2-3, filiformibus, 3-4 mm. longis. Sepalis attenuatis, 8-10 mm. longis, 2-3 mm. latis. Petalis obovatis, truncatis vel rotundatis, 10-13 mm. longis, 6-7 mm. latis, albis vel roseis. Carpellis 8-13. Seminibus 1.5-2 mm. longis, curvatis.

Habitat. Open arid flats in clay soils, in association with *Atriplex spinifera, Monolopia gracilens* and several introduced species of grasses. Lower Sonoran Zone at elevations of 600-900 ft.

Range. CALIFORNIA: KERN CO.: Temblor Valley from near McKittrick to near Buttonwillow, apparently confined to an area a few miles wide and about fifteen miles in extent.

Type Locality. Temblor Valley, 7 mi. northwest of McKittrick on the Lost Hills road, Kern Co., California, 900 ft. elevation. Type specimen: *C. B. Wolf 8413,* April 1, 1937, deposited in the R. S. A. Bot. Gard. Herb., sheet no. 18629. Isotypes distributed as cited below.

Specimens Examined. CALIFORNIA: KERN CO.: Temblor Valley, 7 mi. northwest of McKittrick, on Lost Hills road, *C. B. Wolf 8413* (RSA, 2-7), *8507* (RSA, 2), *9405* (RSA, 2-7, 8a-16); Belridge Oil Field, *Chester Dudley,* April 1937 (CA); 6 mi. west of Buttonwillow, *R. F. Hoover 1847,* April 11, 1937 (Hoover's private collection), *C. B. Wolf 9402* (RSA, 2-7, 8a-10), *9403* (RSA, 2); 10 miles west of Buttonwillow, *C. B. Wolf* 9404 (RSA, 2-7, 8a).

Eremalche kernensis has several features in common with both *E. Parryi* and *E. exilis.* From *E. Parryi* it is distinguished by its much more delicate pubescence (in *Parryi,* although the hairs are often stellate, they are mainly hirsute), by the narrow, attenuate calyx lobes (in *Parryi* they are ovate and abruptly acuminate with the long point nearly as long as the body), by smaller, white or very pale lavender flowers (in *Parryi* the corolla is rose-purple and mainly with petals over 15 mm. long), by smaller, lighter colored, less numerous carpels (in *Parryi* there are often 14-16, dark-colored carpels). From *E. exilis* this species is distinguished largely on its much larger fls. (in *exilis* the petals are rarely more than 5 mm. long), and and by its lighter brown carpels.

The region from which *Eremalche kernensis* comes is one which has not been thoroughly botanized, due largely to the rapidity with which the scanty vegetation springs up and disappears in the occasional season of sufficient rainfall. As a consequence, one can rarely return to a given locality in this region with assurance of finding a species formerly collected there.

Fremontia californica Torr. Pl. Frem. 6. 1853.

This species is an outstanding plant, especially when of tree-like proportions and in full bloom. Unlike *F. mexicana* Davids. it blooms all at once, making a colorful display of pale yellow. One exceptionally large individual in full bloom with thousands of flowers was discovered in Cuddy Canyon, Frazier Mt. region, Kern Co. This is probably the largest specimen known in California. Its measurements were as follows: height 23 feet; spread 30

RANCHO SANTA ANA
18629
HERBARIUM
RANCHO SANTA ANA BOTANIC GARDEN
OF THE NATIVE PLANTS OF CALIFORNIA
Name: EREMALCHE KERNENSIS C. B. Wolf
Locality: TEMBLOR VALLEY, 7 MI. NW. OF MCKITTRICK ON LOST HILLS ROAD.
County: KERN
Life Zone: LOWER SONORAN:- ATRIPLEX SPINIFERA
Habitat: SUN, DRY OPEN FLATS, CLAY
Plant Type: ANNUAL
Collected By: Carl B. Wolf

FIGURE 18. **Eremalche kernensis** C. B. Wolf. Type specimen: Temblor Valley, 7 mi. n.w. of McKittrick on Lost Hills road, Kern Co., California, **C. B. Wolf 8413**, April 1, 1937, R. S. A. Bot. Gard. Herb., sheet no. 18629. Three-eigths size.

feet; four main trunks had diameters of 16, 16, 12 and 8 inches respectively. COLLECTION: KERN CO.: 2 6/10 mi. west of Ridge Route Road, Cuddy Canyon, Frazier Mt. region, 4300 ft., May 23, 1935, *C. B. Wolf 6993* (RSA, 2-8, 9-10).

Flowers of *F. californica* ordinarily have clear yellow anthers, but we have found areas in the San Gabriel Mts. where the anthers are distinctly reddish. COLLECTION: LOS ANGELES CO.: San Gabriel Mts., 8 mi. above Tie Camp Summit on the Aliso Canyon to Buckhorn Flats road, 5500 ft., May 27, 1936, *C. B. Wolf 7861* (RSA, 2-8, 9).

A REVISION OF MENTZELIA LINDLEYI.

(Figure 19)

Mentzelia Lindleyi Torr. & Gray, Fl. No. Amer. **1:** 533. 1840.

Annual 3 to 10 dm. high, simple or branching from the base and spreading to 6 dm. Herbage light green, covered with short, barbed hairs. Lower leaves often 15 to 20 cm. long, irregularly and coarsely pinnatifid. Flowers showy, borne 1 to 4 at the tips of the upper branchlets. Buds conical, 2 to 3 cm. long. Sepals 5, green, turning yellow in anthesis, sometimes caducous. Petals 5, rotately spreading forming a flat, open flower, ovate to obovate, narrowly obtuse to nearly rounded at apex, often with a distinct cusp or mucro, 20 to 33 mm. long, 10 to 30 mm. wide, upper three-fourths golden yellow, basal one-fourth burnt-orange, silken or with a distinct sheen in appearance Stamens about 100, 2 to 3 cm. long, filaments mostly filiform, but a few flattened. Style 3 to 4 cm. long. Capsule 3 to 7 cm. long, fleshy when immature, becoming membranous and shrinking greatly at maturity, dehiscent at apex. Seeds about 1 mm. long, numerous, irregularly prismatic, tuberculate, gray to light brown, somewhat shiny. Seedlings light green, hispid throughout; cotyledons petiolate, the blade broadly ovate to obovate, 6 to 10 mm. long with 3 main veins, obtuse to rounded at apex, tapering gradually at the base to the petiole, first few pairs of leaves opposite, shallowly to deeply pinnatifid, 1 to 3 cm. long. Flowers March to May. Seeds May to June.

Habitat. Dry, open, usually rocky hillsides at elevations of usually less than 4000 ft., Upper Sonoran Zone.

Range. California: In the coastal region of central California from Marin and Solano Counties to Alameda, Santa Clara, Stanislaus and Fresno Counties; in the Sierra Nevada foothills from Tuolumne County to Tulare County. An escape from cultivation at several other localities throughout the state.

KEY TO THE SUBSPECIES

Petals obovate, 25-35mm. or 40 mm. long, 16-33 mm. wide, broadest above the middle, abruptly contracted at apex and tipped with a pronounced mucro. Coast Ranges . . . . . *M. Lindleyi typica*

Petals ovate to narrowly obovate, 20-30 mm. long, 10-15 mm. wide, broadest about the middle, tapering to the apex, mucro less pronounced. Sierra Nevada foothills . . . . . *M. Lindleyi crocea*

Mentzelia Lindleyi typica C. B. Wolf, subsp. nom. nov.

Usually a very vigorous plant with the leaves deeply pinnatifid. Petals broadly obovate, 25 to 35 or occasionally 40 mm. long, 16 to 33 mm. wide, broadest well above the middle, abruptly contracted at apex and tipped with a pronounced mucro 2 to 4 mm. long. (*M. Lindleyi* Torr. & Gray, l. c.; *Bartonia aurea* Lindl., Bot. Reg. 22: *pl. 1831.* 1836.).

Habitat. Sunny, rocky slopes of the Upper Sonoran Zone.

Range. California: Coast Ranges from Marin and Solano Counties to Santa Clara, Stanislaus and Fresno Counties. Most abundant and best developed in the Mt. Hamilton Range. Escaped from cultivation, sparingly and sporadically established in a number of places in California.

Type Locality. The plants upon which Lindley described *Bartonia aurea* were obtained by David Douglas, and like many other collections made by him, the exact locality can probably not be determined. It is reasonably certain, however, that Douglas got his specimens and seeds from the Mt. Hamilton Range or the adjacent lowlands.

Representative Specimens Examined. CALIFORNIA: HUMBOLDT CO.: rocky road-cut near Garberville, *J. T. Howell 6715* (CA), probably an escape from cultivation. MARIN CO.: fresh road-cut near Alto, *Belle R. Jacobson,* June 1, 1931 (CA), probably an escape from cultivation. SOLANO CO.: near the ferry, Vallejo, *A. A. Heller 13725* (DS). CONTRA COSTA CO.: Benicia, *A. Eastwood 10487* (CA). ALAMEDA CO.: Morrison Canyon, *W. L. Jepson,* June 20, 1897 (DS); Niles Canyon, *M. E. Jones,* April 10, 1934 (P); Cedar Mt., *A. D. E. Elmer 4354* (DS, UC, CA, P); Arroyo Mocho, *H. E. McMinn,* June 3, 1925 (DS); Milpitas, *K. Brandegee,* no date (UC); Los Buellos Hills, Milpitas, *R. J. Smith 1* (UC). SANTA CLARA CO.: Mt. Hamilton, *A. A. Heller 8616* (DS), *Evelyn Cannon,* May 14, 1892 (CA), *H. P. Chandler,* July 29, 1899 (UC), *J. A. Chesnut,* July 1888 (UC); Mt. Hamilton Range, Copernicus Pk., *C. W.* & *H. K. Sharsmith 1048* (UC); Coyote Creek, *H. P. Chandler 913* (UC); Soda Springs Canyon, *W. R. Dudley 4154* (DS); 4 mi. so. of Santa Clara, *A. Eastwood* & *J. T. Howell 4512* (CA); Almaden Canyon, *R. Bacigalupi 1328* (DS); cult. at Stanford University, from seed from Theodore Payne, July 17, 1927, *C. B.*

Wolf 631 (RSA, 2). STANISLAUS CO.: head of Arroyo del Puerto, Red Mountains, Mt. Hamilton Range, *C. W.* & *H. K. Sharsmith 1680* (UC), 1808 (UC); Mt. Day, Mt. Hamilton Range, *C. W.* & *H. K. Sharsmith 3353* (UC); Arroyo del Puerto, at mouth of Adobe Creek, Red Mountains, Mt. Hamilton Range, *A. Carter 1167* (RSA, UC). FRESNO CO.: canyon, Little Panoche Valley, near Mercy School, *Chas. H. Quibell 2915* (P); hills 20 mi. from Fresno, *R. Brown,* May 2, 1896 (CA), this collection must have come from the Coast Ranges. LOS ANGELES CO.: Pasadena, *G. B. Grant,* July 31, 1901 (DS), an escape from cultivation. ORANGE CO.: bluffs at Laguna Beach, *F. J. Billings 5* (DS), an escape from cultivation; cult. at Rancho Santa Ana Bot. Garden from seeds obtained from Theodore Payne, *C. B. Wolf 5584* (RSA, 2), *P. C. Everett 6723* (RSA).

Mentzelia Lindleyi crocea (Kell.) C. B. Wolf, subsp. comb. nov.

Usually a somewhat smaller plant than subspecies *typica,* with leaves less deeply pinnatifid. Petals ovate to narrowly obovate, 20 to 30 mm. long, 10 to 15 mm. wide, broadest about the middle, tapering to the acute to obtuse apex, tipped with a much less pronounced mucro than in subspecies *typica.* (*M. crocea* Kell. Proc. Calif. Acad. Sci. 7: 110. 1876.)

Habitat. Sunny, exposed rocky slopes, commonly locally abundant, but not extending over very large areas in any region. Upper Sonoran Zone.

Range. California: Sierra Nevada foothills from Tuolumne County to Tulare County.

Type Locality. The plants upon which Kellogg described *M. crocea* were collected in the Sierra Nevada foothills by Eisen. According to Jepson (Fl. Calif. 2: 533. 1936.) the specimens probably came from Fresno Co. Eisen's specimens were deposited in the California Academy of Sciences and were apparently lost in the fire of 1906.

Specimens Examined. CALIFORNIA: TUOLUMNE CO.: bluffs at mouth of Bear Creek, Stanislaus River, *R. S. Ferris 1670* (DS, CA); Moccasin Creek, 3 4/10 mi. so. of Moccasin Creek Power House on Coulterville to Big Oak Flat road, *C. B. Wolf 4876* (RSA, 2-5), *5125* (RSA, 2-4), *P. C. Everett,*

EXPLANATION OF FIGURE 19. a-j, **Mentzelia Lindleyi typica.** k-q, **Mentzelia Lindleyi crocea.** a, seedling of Prop. No. 1657 (Payne's strain); k, seedling of Prop. No. 1862 (Moccasin creek, **Wolf 4876**). b-j & l-q, tracings of petals from mounted herbarium sheets. b, **H. P. Chandler 913**; c, **Elmer 4354**; d, **Eastwood 12474**; e, **R. J. Smith 1**; f, **Eastwood 10487**; g, **C. W. & H. K. Sharsmith 1048**; h, **Jones,** April 10, 1934; i, **Wolf 5584**; j, **Quibell 2915**; l, **Everett 7874**; m, **Winblad,** in 1937; n, **J. W. Congdon,** May 8, 1892; o, **Wolf 4876**; p, **Lembert,** in 1894; q, **Ferris 1670.** All natural size.

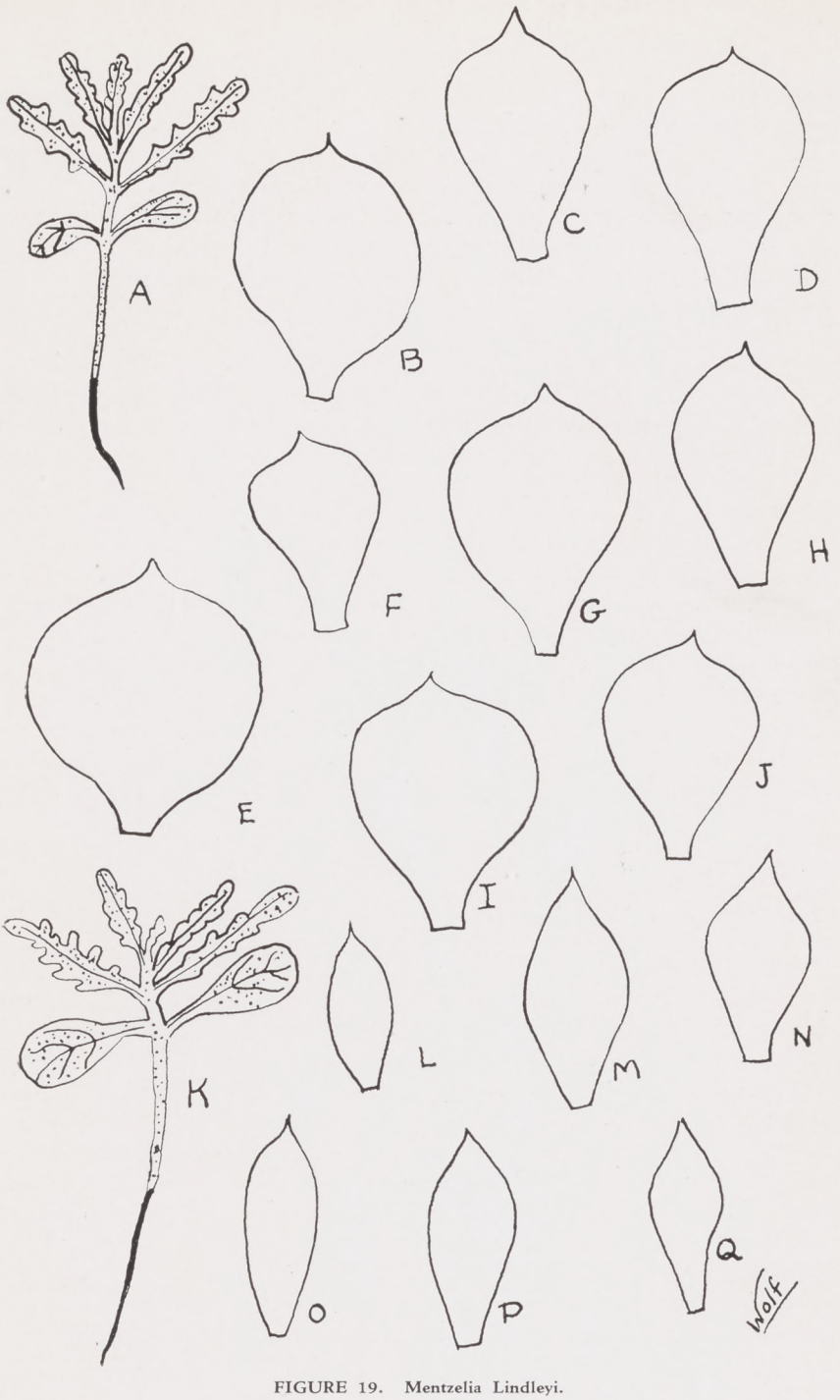

FIGURE 19. Mentzelia Lindleyi.

7874 (RSA) is cultivated seedlings grown at the Garden from *C. B. Wolf 5125*. MARIPOSA CO.: Hennessey Ranch, *J. B. Lembert,* April 1894 (UC); Hite's Cave, *J. W. Congdon,* May 8, 1892 (UC); Hell Hollow, near Bagby, *Ivan Bronson,* May 11, 1929 (CA). FRESNO CO.: junction of No. & So. Forks of Kings River, *W. B. Duncan,* March 5, 1923 (DS); above Trimmer Springs, *Ynez W. Winblad,* May 16, 1937 (CA). TULARE CO.: So. Fork of Kaweah River, *Culbertson 4306* (P); grassy slopes of Tule River, probably *C. A. Purpus 1545* (UC).

Mentzelia Lindleyi typica, known variously as Blazing Star or Golden Bartonia, is of more than passing interest in that the seeds collected by Douglas and taken to England were shortly cultivated with success. Lindley's figure in the Botanical Register was prepared from cultivated specimens not over two or three generations removed from the wild. Since then the species has probably been grown at least forty generations. Plants which we believe are direct descendants of the original English stock (seed from Theodore Payne) show no great differences with Lindley's figure, nor with specimens of recent collection in the Mt. Hamilton Range.

Blazing Star is one of the most beautiful of all California annuals and is easily grown in almost any sunny situation.

Mentzelia Lindleyi crocea is probably unknown in cultivation and even in recent botanical papers dealing with *Mentzelia* has been treated only as a synonym of *M. Lindleyi*. Miss Darlington's description of *M. Lindleyi* (Ann. Mo. Bot. Gard. 21: 199. 1934.) appears to be based mainly on the plants of the Coast Range, although she had before her material from the Sierra Nevada foothills.

We first grew *M. Lindleyi crocea* in 1934 from seed obtained on Moccasin Creek, Tuolumne Co. (*Wolf 5125*). Under cultivation the plants were markedly different from *M. Lindleyi typica* and never attained the vigorous growth or profusion of flowers of the latter. After a couple of seasons of growing *M. Lindleyi crocea* we decided that it was so much less attractive and less vigorous that *M. Lindleyi typica* that we have not continued its culture. However, our field and cultural studies led us to the conclusion that the plant could not be the same as *M. Lindleyi typica.* It is obviously a close relative of the latter, differing in its somewhat smaller growth and the shape of the petals, but we now feel that these differences linked with geographic distribution are only of subspecific value. Of specimens cited under *M. Lindleyi crocea* only two suggest intermediates between it and subspecies *typica*: *J. W. Congdon* (Hite's Cave) and *C. A. Purpus* (Tule River).

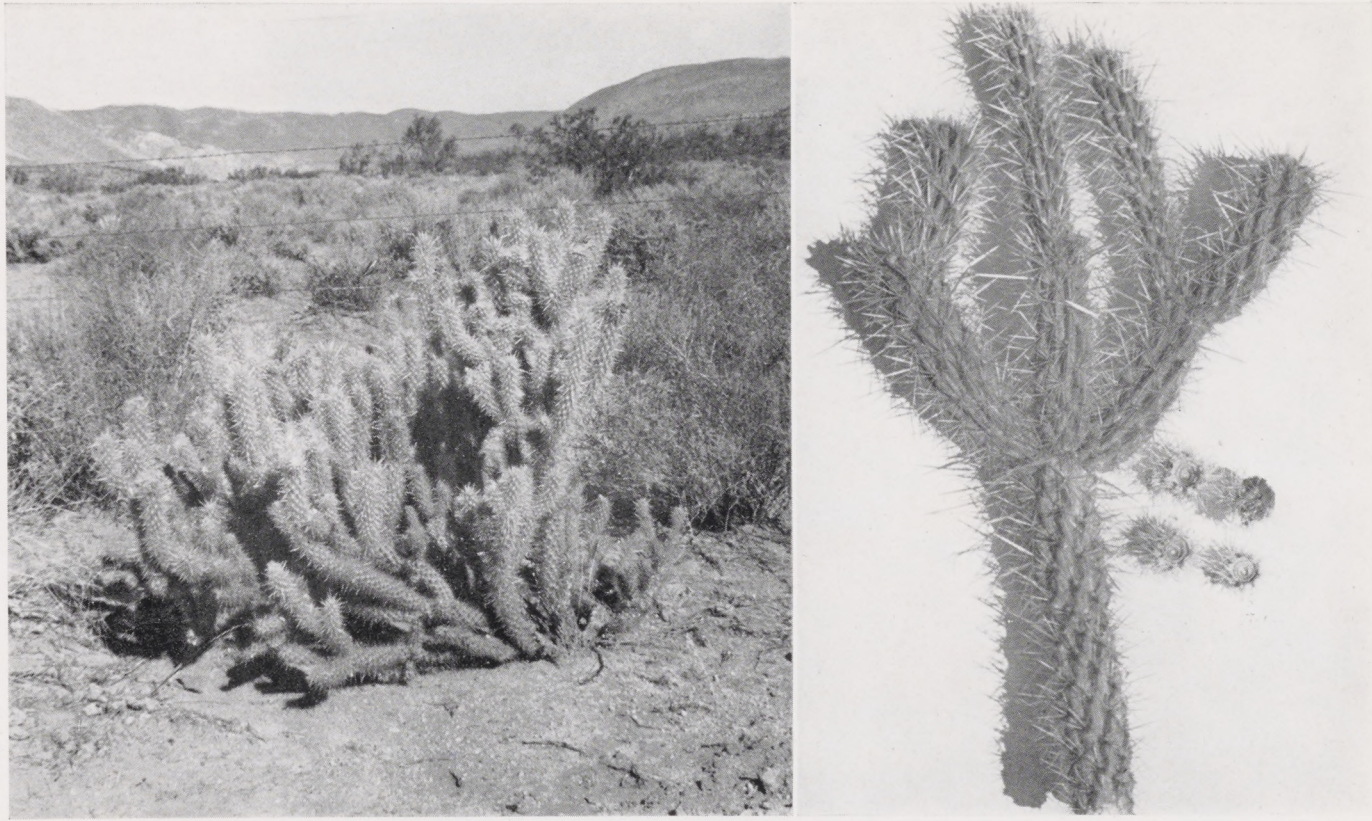

FIGURE 20. **Opuntia acanthocarpa Ganderi. LEFT.** Type plant, 3 mi. below old Vallecito Stage Station, 1 m. high, **C. B. Wolf 9424,** June 12, 1938. **RIGHT.** Type specimen: **C. B. Wolf 9424,** R. S. A. Bot. Gard. Herb., sheet no. 18631. One-third size.

Opuntia acanthocarpa Ganderi C. B. Wolf, subsp. nov.

(Figure 20)

An erect, sparingly branched shrub about 1 m. high, usually about equally broad. Main stem 5-8 cm. in diam. Joints pale green, 6-15 or 20 cm. long, 3-5 cm. thick; tubercles 12-16 mm. long, 4-6 mm. wide, areoles elliptic, 4-6 mm. long, bearing numerous spines with light colored sheaths; principal spine central, stout, 20-30 mm. long, secondary spines 15-20, delicate, 5-10 or 15 mm. long. Flowers with petals about 20 mm. long, greenish-yellow, tinged with red. Fruits about 20 mm. long, depressed globose, umbilicus depressed, areoles mainly confined to the upper half of of the fruit, bearing 12-16 more or less equal slender spines 8-13 mm. long. Seeds grayish-brown, 5-6 mm. long, 4-5 mm. wide, about 2 mm. thick.

Frutex, erectus, circa 1 m. altus et latus. Tuberculis 12-16 mm. longis, 4-6 mm. latis. Areolis ellipticis, 4-6 mm. longis. Spina centrali una, robusta, 20-30 mm. longa. Spinis radialibus 15-20, 5-15 mm. longis. Fructus 20 mm. longus, spinosus. Seminibus 5-6 mm. longis, 4-5 mm. latis.

Habitat. Lower Sonoran Zone, in desert washes and on the low mesas in association with *Larrea divaricata, Hymenoclea salsola, Agave deserti, Fouquieria splendens, Opuntia Bigelovii, echinocarpa* and *Fosbergii.*

Range. CALIFORNIA: SAN DIEGO CO.: western border of the Colorado Desert at the base of the Laguna Mts., from Carrizo to San Felipe Valley. Especially abundant from Cane Brake Canyon to Vallecito.

Type Locality. San Diego Co., California, 3 mi. below the old Vallecito Stage Station. Type Specimen: *C. B. Wolf 9424,* June 12, 1938, R. S. A. Bot. Gard. Herb., sheet no. 18631. Isotypes distributed as indicated below.

Specimens Examined. CALIFORNIA: SAN DIEGO CO.: *C. B. Wolf 9424* (RSA, 2-8, type collection); mouth of Cane Brake Canyon, *C. B. Wolf 9394* (RSA, 2); ½ mi. below Agua Caliente Hot Springs, *C. B. Wolf 9396* (RSA, 2). The latter collection was from a plant that was especially robust and had very much thickened joints. Occasional plants of this sort are scattered over much of the range of typical *Ganderi.* Propagation materials (cuttings) were obtained of all of the above collection for cultivation at Rancho Santa Ana Botanic Garden.

It is strange that the distinctive features of this *Opuntia* have escaped collectors' notice, since it extends over such a considerable area. It differs from *O. acanthocarpa* Engelm. & Bigel. of the eastern Colorado and Mojave Deserts in having a much more vigorous growth habit, greener color to the joints, but particularly in the more delicate, but much more numerous spines. *C. B. Wolf 9390* (RSA, 2) from 11 mi. so. of Palo Verde on the road

FIGURE 21. **Opuntia echinocarpa Parkeri. LEFT.** Plant at foot of Mountain Springs Grade, 1 m. high, **C. B. Wolf 9429,** June 12, 1938. **CENTER.** Fruiting branch in Bot. Gard., Prop. No. 362, Aug. 1938. One-half size. **RIGHT.** Plant in Bot. Gard., 6 dm. high., Prop. No. 362, Aug. 1938.

to Ogilby, Imperial Co., Calif., is an example of *O. acanthocarpa* as it is usually found on the Colorado Desert. Plants of *O. acanthocarpa* from parts of the Mojave Desert are less stoutly spined, but do not bear the numerous spines of subspecies *Ganderi,* nor do they have the vigorous growth habit and clean light green colored joints.

This new subspecies is named in honor of Mr. F. F. Gander of the Museum of Natural History, San Diego, California, whose studies of the San Diego County flora are adding greatly to the knowledge of California botany.

Opuntia echinocarpa Parkeri (Engelm.) Coult. Contrib. U. S. Nat. Herb. **3:** 446. 1896. (Figure 21)

This *Opuntia* was described by Coulter as differing from *O. echinocarpa* Engelm. in that is was "Taller (9 to 15 dm. high), with erect branches, longer (10 cm.) joints, crested tubercles 18 mm. long, light yellowish-brown spines in sheaths of similar color (about 6 smaller radiant ones), depressed globose or oval less spiny fruit with flat or funnelform umbilicus, and irregular seeds (6 mm. in diameter) with narrow twisted commissure.—Type, C. F. Parker of 1879 in Herb. Mo. Bot. Gard." The type locality is given as "San Diego County, California, east side of mountains facing desert."

Our field and cultural studies over a number of years convince us that *O. echinocarpa Parkeri* is a distinctive entity. In the region around Mountain Springs many square miles are covered with this plant. It begins at the base of the Mountain Springs Grade and is abundant for several miles along both sides of the highway, ascending to the extreme upper limit of the Lower Sonoran Zone, where it drops out and is replaced by *O. Parryi* Engelm. The plants are conspicuously thick-jointed, erect and sparingly branched in comparison with *O. echinocarpa* of the adjacent desert lowlands. We can see no essential differences between these plants of the Mountain Springs region and Coulter's description of *O. echinocarpa Parkeri,* and it may well be that Parker's type was obtained in the immediate vicinity of Mountain Springs.

In the region around Borego Valley we have observed and collected what also seems to be *Opuntia echinocarpa Parkeri,* but have not thus far noted it between there and Mountain Springs. Typical *O. echinocarpa* with much-branched congested growth is plentiful on the open desert to the east of Borego Valley.

Under cultivation at the Garden, *O. echinocarpa Parkeri* has retained its distinctive identity for ten years, in a collection of plants made by O. W. Howard & E. R. Johnson, Prop. No. 362, March 2, 1928, from the foot of Mountain Springs Grade, Imperial Co. The following collections of herbarium specimens and propagation materials have also been made: SAN DIEGO CO.: Borego State Park, in the vicinity of the park headquarters, 1500 ft., petals pale yellow within, greenish without, but also faintly

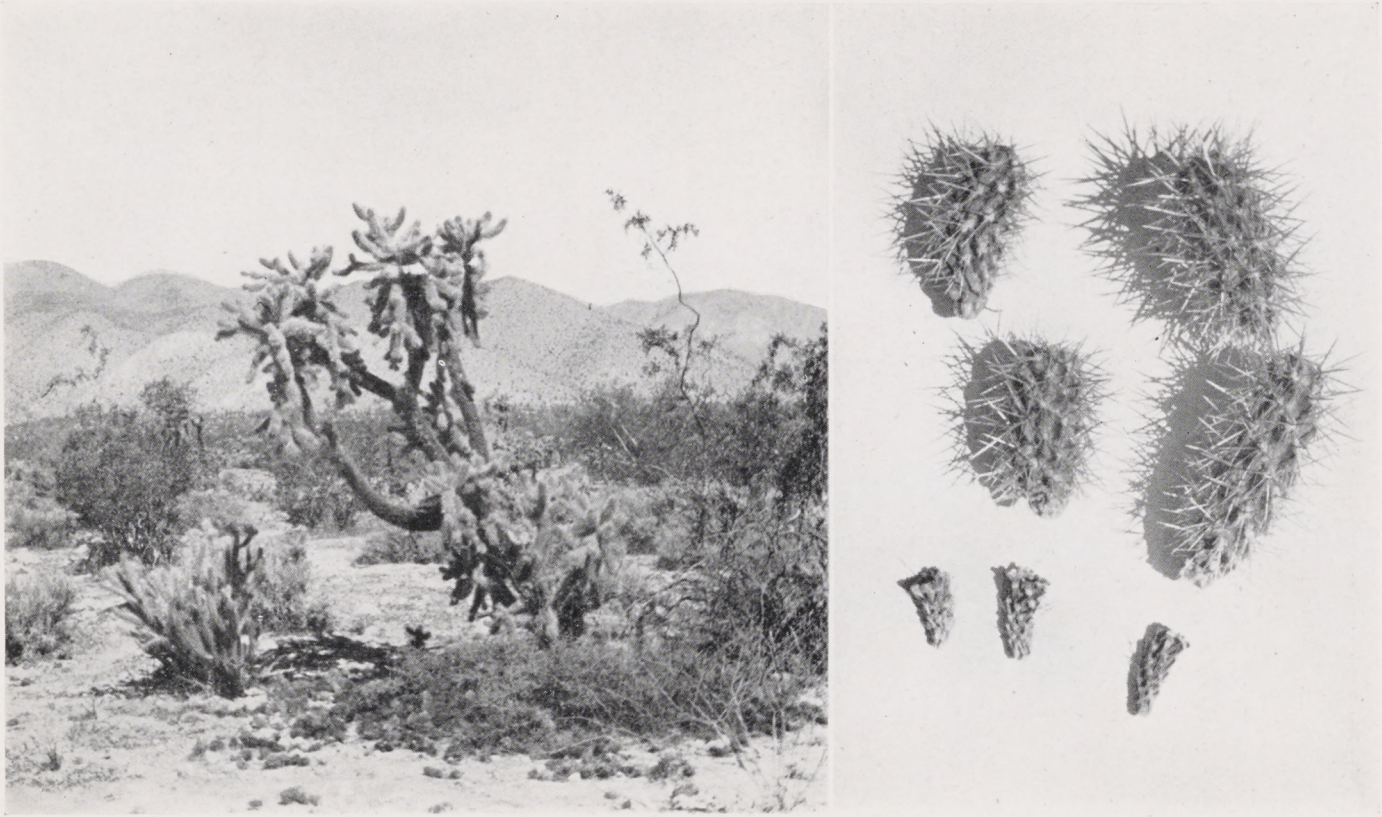

FIGURE 22. **Opuntia Fosbergii. LEFT.** Plant at Cane Brake Canyon, 2.5 m. high, **C. B. Wolf 9425,** June 12, 1938. **RIGHT.** Joints and fruits of same. One-third size.

reddish, in association with *Encelia farinosa,* April 7, 1937, *C. B. Wolf 8472* (RSA, 2), Prop. No. 2776 (cuttings) was obtained at the same time from the same plant. IMPERIAL CO.: foot of Mountain Springs Grade, open rocky slopes, in association with *Larrea divaricata,* June 12, 1938, *C. B. Wolf 9429* (RSA, 2-8), Prop. No. 3201 (cuttings) was obtained at the same time from the same plant.

Opuntia Fosbergii C. B. Wolf, sp. nom. nov. (Figure 22)

Opuntia Bigelovii var. *Hoffmannii* Fosberg, Bull. South. Calif. Acad. 32: 121. 1933, not *O. Hoffmannii* H. Bravo, An. Inst. Biol. Mex. 1: 89. 1930.

This plant described by Fosberg from Cane Brake Canyon, eastern San Diego County, California, is in our opinion a hybrid between *O. Bigelovii* and *O. echinocarpa.* However, the plant occupies an extensive area in eastern San Diego County and certainly requires a name, but we feel that to continue to regard it as a variety of *O. Bigelovii* is not advisable, nor can it be raised to specific rank under the name of *O. Hoffmannii,* since that name has been used for a Mexican species. We, therefore, propose the name *O. Fosbergii* in honor of its discoverer.

We have twice visited the region where *O. Fosbergii* grows and have noted that it has a remarkably uniform growth habit, a distribution from near Vallecito to the head of Mason Valley and that it is associated not only with *O. Bigelovii,* but also with *O. echinocarpa* and *O. acanthocarpa Ganderi.* The plants of *O. Fosbergii* are vigorous in vegetative growth and appear to make far greater growth per year than any of the other species with which they grow. Very few flowers or fruits are borne on the plants (we estimated in the field that in 1938 less than one plant in a hundred had fruit) and what fruits we have been able to examine are all sterile. These two features (vigorous growth and sterility) indicate a hybrid nature.

The features in which *O. Fosbergii* resembles *O. Bigelovii* are: somewhat similar growth habit; readily disarticulating joints; and fruits. It resembles *O. echinocarpa* in its spines and in the shape of the tubercles, which are definitely elongated rather than quadrangular as in *O. Bigelovii.* The uniformity of the plants of *O. Fosbergii* suggest that they are all first generation hybrids that have spread over the present area by vegetative means in much the same way as suggested under *O. Munzii,* which is similar in general appearance and which is believed to be a closely related hybrid of partly different parentage.

In addition to examining the type of *O. Fosbergii* (*Fosberg 8602,* Pomona College Herb.) we have made the following collections, all of which were accompanied by propagation material (cuttings) for growth at the Garden: SAN DIEGO CO.: mouth of Cane Brake Canyon, *C. B. Wolf 9392* (RSA, 2-4), *9394* (RSA, 2), *9425* (RSA, 2-7).

Opuntia Munzii C. B. Wolf, sp. nov. (Figure 23)

An erect arborescent plant, growing to a height of 2-4 m., nearly equally

FIGURE 23. **Opuntia Munzii. LEFT.** Type plant, Chocolate Mts., 2.5 m. high. **C. B. Wolf 1875 & 9388,** photo Jan. 6, 1938. **CENTER.** Fresh joints and fruits from Bot. Gard., Prop. No. 1082, Aug. 1938, one-third size. **RIGHT.** Plant in Bot. Gard., 2.5 m. high, Prop. No. 1082, Aug. 1938.

broad; main trunk with rough dark bark, 10-15 cm. in diam., lower branches mainly bare, the lateral joints largely confined to the terminal portions, the ultimate joints slightly drooping to somewhat pendulous. Joints 6-15 cm. long (occasionally up to 30 cm. long), 3-5 cm. thick, readily disarticulating. Tubercles strongly raised, 10-16 mm. long, 5-6 mm. wide. Areoles 5-6 mm. long, slightly narrower, filled with numerous, short, light tan glochids and 10-12 light yellow, acicular, subequal spines 10-20 mm. long. Flowers sparse, petals 15-20 mm. long, yellowish-green, tinged with red. Fruits sterile, 25-35 mm. long, globose, fleshy when immature; umbilicus depressed, tubercles about 4 mm. long, nearly equally broad, the areoles filled with short glochids and 5-8 slender, acicular spines 5-10 mm. long, soon deciduous.

Frutex, erectus, 2-4 m. altus et latus. Tuberculis 10-16 mm. longis, 5-6 mm. latis. Areolis 5-6 mm. longis, 10-12 spinis, 10-20 mm. longis. Fructus 25-35 mm. longus, spinosus, sterilis.

HABITAT. Canyon walls and ravines in gravel and rock associated with *Cercidium sp., Encelia farinosa, Opuntia Bigelovii* and *echinocarpa*. Lower Sonoran Zone at elevations of 500-1000 ft.

RANGE. Apparently confined to the Chocolate Mts., Colorado Desert, Imperial Co., California, where it extends over many square miles in the vicinity of Beal's Well.

TYPE LOCALITY. 11 mi. east of Niland on road to Beal's Well, Chocolate Mts., Colorado Desert, Imperial Co., California. Type specimen: *C. B. Wolf 1875,* March 12, 1931, deposited in R. S. A. Bot. Gard. Herb., sheet no. 5142.

SPECIMENS EXAMINED. CALIFORNIA: IMPERIAL CO.: Chocolate Mts., 11 miles east of Niland, *C. B. Wolf 1875* (RSA), from the same plant as the preceding—*C. B. Wolf 9388* (RSA, DS), *P. A. Munz,* March 12, 1931 (P); 5 6/10 mi. above Beal's Well, *C. B. Wolf 9389* (RSA, DS). Collections by *C. B. Wolf* (*1875, 9388* & *9389*) accompanied by cuttings for propagation at the Garden.

We have had this plant under observation since 1931 when with Dr. P. A. Munz we collected in the Chocolate Mts. and obtained cuttings (Prop. No. 1082) which have since grown to heights of nearly 3 meters. The extremely vigorous growth of these cuttings in the Garden has marked it as one of the most rapid of all of the native California *Cylindropuntias*. In 1937 a few fruits were borne on our cultivated plants, but they were sterile. In 1938 several plants set fruits, but they also appear to be entirely sterile.

This is probably the tallest growing species of any of the cacti native to California except *Cereus gigantea*. One plant above Beal's Well measured nearly 4 m. high, on Jan. 6, 1938, others were nearly as high.

We believe that *Opuntia Munzii* is a hybrid between *O. Bigelovii* and *O. acanthocarpa*. Its vigorous growth and sterile fruits are characteristics of hybrids. Its readily disarticulating joints, nature of branching and fruits suggest *O. Bigelovii*. Its spines and tubercle shape (elongated) suggest *O. acanthocarpa*, a species which grows in the region, but which we have not actually seen associated with *O. Munzii*.

The remarkable similarity of general appearance of *O. Munzii* and *O. Fosbergii* strengthen our assumption that both have arisen as hybrids with *O. Bigelovii* as one of the parents. The uniformity of the plants of *O. Munzii* suggest that they are first generation crosses that have spread by vegetative means over extensive areas of the Chocolate Mts. Winter rains and floods could easily account for the downward distribution of the joints which litter the ground beneath nearly every plant, while the habit of the desert pack rat of using the joints for nests could easily account for lateral distribution. However, it is not at all necessary to assume that the present distribution has taken place in recent times, nor at a rapid rate, since the plants in the Chocolate Mts. may well have been there for thousands of years.

We have described this *Opuntia* as a species because we felt that a plant occuring in such abundance and having such distinctive features merits a name for ready reference. Our assumption that it is a hybrid has not been proven by experimental crosses, but it does offer a reasonable explanation for its origin.

Opuntia Munzii is named in honor of Dr. P. A. Munz, who first called my attention to it and accompanied me to the Chocolate Mts. when the type was collected.

Godetia Whitneyi (Gray) T. Moore, Flor. and Pomol. 101. 1871.

This species has long been known in cultivation under the name of *G. grandiflora* and has been the source of many beautiful horticultural strains. *G. Whitneyi* was originally collected at Shelter Cove, Humboldt Co., Calif., in 1866 (*Bolander 6534*). According to Jepson (Flora of Calif. 2: 579. 1936.) the species may now be extinct at Shelter Cove. Hitchcock (Bot. Gaz. 89: 343. 1930.) cites but three collections from the wild in his revision, all from Shelter Cove: *Bolander 6534, Peirson,* in 1927, and *Vasey,* 1876.

In 1934 we visited Shelter Cove in search of *G. Whitneyi,* but were unsuccessful in finding it, although there was an abundance of *G. amoena* G. Don: *C. B. Wolf 5843* (RSA). About 25 miles to the south of Shelter Cove, between Hardy and Rockport at the north side of the mouth of Juan Creek we did find *G. Whitneyi*. There on cliffs facing the ocean were comparatively large stands: *C. B. Wolf 5817* (RSA, 2-7). We also obtained a small amount of seed from which we have grown the species at the Garden.

Several years ago we obtained seeds of *G. Whitneyi* from Theodore Payne, who sells it under the name of *G. grandiflora.* Under cultivation at the Garden this strain has a strict, erect habit, a congested inflorescence, large, brilliantly-colored petals and thickened, stubby capsules: *C. B. Wolf 5699* (RSA, 2-3), also *C. B. Wolf 9430* (RSA, 2-7, 8a-10).

Our Juan Creek strain of *G. Whitneyi,* as cultivated at the Garden (*C. B. Wolf 9431,* RSA, 2-7, 8a-10) in comparison with Payne's strain has a more spreading growth habit and less brilliantly-colored flowers, but flower size and capsule shape are essentially alike. These differences could readily have been obtained through selection during the many years that Payne's strain has been under cultivation in England and in this country, or the plants from which the cultivated material originated may have displayed those superior horticultural features. However, the two certainly fall within the limits of variation for *G. Whitneyi.*

A collection made in the wild in 1927 at Usal, Mendocino Co., Calif. (*C. B. Wolf 1290,* RSA), a station about midway between Shelter Cove and Juan Creek, is somewhat intermediate between *G. amoena* and *G. Whitneyi.* It has the somewhat thickened capsules of *G. Whitneyi,* but in other features is more nearly like *G. amoena.* A somewhat similar plant appears occasionally in our cultivated plots of *G. Whitneyi* (Payne's strain) and has the brilliant flowers of *G. Whitneyi,* but the growth habit of *G. amoena* and capsules only slightly thicker than *G. amoena* (*C. B. Wolf 7563,* RSA, 2-3). This latter plant appears to us to be a hybrid between *G. amoena* and *G. Whitneyi* and is sterile.

Although *G. Whitneyi* has several features suggesting relationships with *G. amoena* and appears to hybridize with it, its congested inflorescence and thickened capsules suggest that it is more closely related to *G. purpurea.* Jepson (l. c. 582) has suggested that *G. purpurea* G. Don. is closely related to *G. quadrivulnera* Spach., but our field, herbarium and cultural studies do not confirm this view.

Fraxinus anomala Torr.; S. Wats. Bot. King's Exped. 283. 1874.

This shrub or small tree has been known in southern California only from the Providence and Panamint Mts. It also occurs on Clark Mt., in eastern San Bernardino County, 1 mi. so. of Coliseum Mine, at 6000 ft. on the limestone slopes at the base of cliffs, and in association with *Pinus monophylla.* COLLECTIONS: May 28, 1935, *C. B. Wolf 7077* (RSA, 2-8, 9-11), Oct. 7, 1935, *C. B. Wolf 7618* (RSA).

Buddleia utahensis Coville, Proc. Biol. Soc. Wash. **7:** 69. 1892.

Collection of specimens of this species in California adds another

family to the list native to the state. In addition to the collections cited below, it is understood that Mr. M. F. Gilman of Death Valley has also obtained the species in California, but I have not seen his material. COLLECTIONS: SAN BERNARDINO CO.: southern end of Kingston Mts., at northeast base of pass between Kingston and Francis Spring, 3500 ft., May 15, 1935, *C. B. Wolf 6857* (RSA, 2-8), also Oct. 8, 1935, *C. B. Wolf 7627* (RSA, 2-8, 9-19); northern end of Kingston Mts., 1 4/10 mi. northwest of Beck Spring, 3500 ft., July 31, 1937, *C. B. Wolf & P. C. Everett 9039* (RSA, 2-8, 9-10).

Frasera Parryi Torr. Bot. Mex. Bound. 156. 1859.

Swertia Parryi (Torr.) O. Ktze. Rev. Gen. 2: 430. 1891.

This species is well known from the San Gabriel, San Bernardino and San Jacinto Mts., to the mountains of the interior of San Diego Co. It commonly grows scattered in the Yellow Pine forests in decomposed granite. It also occurs in the Santa Ana Mts., where it is locally abundant: Santa Ana Mts., Riverside Co., north end of La Cienega, in decomposed granite, 2400 ft., June 17, 1936, *C. B. Wolf 7963* (RSA, 2-7, 8a-9), also *P. C. Everett 8234* (RSA, 2-5).

Eriodictyon angustifolium Nutt. Journ. Acad. Nat. Sci. Philad. II. **2:** 181. 1848.

This species was found in California in the New York Mts. by Dr. P. A. Munz and upon his suggestion is here reported. In the vicinity of Keystone Spring, Keystone Canyon, New York Mts., San Bernardino Co., at an elevation of about 5500 ft. the species is abundant, forming large colonies like those so common for other species of *Eriodictyon*. COLLECTIONS: SAN BERNARDINO CO.: *P. A. Munz,* May 1935 (P), *C. B. Wolf & P. C. Everett,* July 30, 1937, *9025* (RSA, 2-8, 9-10).

Eriodictyon californicum (Hook. & Arn.) Torr. Bot. Mex. Bound. 148. 1859.

Attempts to germinate seeds of this species as well as some other kinds of *Eriodictyon* have never met with success in our propagation department, apparently because we have not yet used the correct method. The California species of *Eriodictyon* all spread by underground stems and roots, often forming dense stands. I have searched in the wild over a period of years in hope of finding seedlings of *Eriodictyon,* but have been rewarded only once. In the Sierra Nevada foothills of Fresno County, 6/10 mi. below Miramonte on road to Dunlap on June 27, 1933, I discovered a number of ash heaps from brush that had been burned the previous winter. At this point *Fremontia californica* and *Eriodictyon californicum* were abundant. Examination of the ash heaps showed numerous seedlings of several species, but

a few small plants of *Eriodictyon* were of the most interest. Unlike young vegetative suckers from old plants these small plants had several pairs of opposite leaves, the remains of cotyledonary leaves, and a well developed root system radiating off in all directions, as is normal for seedlings. COLLECTION: *C. B. Wolf 5059* (RSA, 2-5). It is hazardous to attempt to evaluate the comparative influences of heat and ashes in the germination of the above seeds, but experiments in progress in our nursery with seeds of other plants indicate that both are essential in hastening germination.

Amsinckia Douglasiana A. DC. Prod. **10:** 118. 1846.

This species was listed in Munz's Manual of Southern California Botany (1935) as to be expected in the northern limits of southern California. It can now be definitely listed for southern California, based upon two collections: Sespe Creek, Ventura Co., *Clokey & Anderson 6855* (RSA); 2 7/10 mi. so. of summit of Pine Mt. Grade on Ojai to Cuyama Valley road, Ventura Co., May 22, 1935, *C. B. Wolf 6953* (RSA, 2-7, 8a & 9). The latter collection was determined by Dr. I. M. Johnston in 1936.

Lippia Wrightii Gray, Amer. Journ. Sci. ser. II. **15:** 98. 1853.

This shrubby species has been known to California from the Providence Mts. for some time, but also occurs on Clark Mt. some distance to the northeast. COLLECTION: SAN BERNARDINO CO.: Clark Mt. 1/8 mi. east of Pachalka Spring, 5000 ft., Oct. 5, 1935, *C. B. Wolf 7592* (RSA, 2-8, 9-12).

Verbascum thapsus L. Sp. Pl. 177. 1753.

The Common Mullein is a widespread, introduced species of the western United States and seems to have followed civilization into many remote areas. In northern California the species is a characteristic plant along river bottoms and borders of old neglected fields. In southern California the species is much less abundant, but is found in a number of spots in our mountains, particularly in the San Bernardino and Palomar ranges. It also is established on the west slope of the Santa Ana Mts. COLLECTION: ORANGE CO.: Santa Ana Mts., Silverado Canyon, 2000 ft., Nov. 3, 1933, *C. B. Wolf & E. R. Johnson 5533* (RSA, 2-4). For some reason the species have never become established in our southern California lowlands, yet abundant seed is produced on plants at the mountain stations and some must be regularly carried down to lower elevations by winter floods.

Penstemon breviflorus Lindl. Bot. Reg. **23:** *pl. 1946.* 1837.

The southern limit of distribution for this species has previously been given as the Liebre Mts. It is now known from the San Gabriel Mts.

COLLECTION: LOS ANGELES CO.: San Gabriel Mts., Indian Canyon Camp, 2 mi. off Soledad Canyon, 3000 ft., May 27, 1936, *C. B. Wolf 7842* (RSA, 2-7).

A REVISION OF APLOPAPPUS ERICOIDES

In 1935 I reported *Aplopappus Eastwoodae* Hall for the Santa Cruz Mts., based upon specimens with pubescent achenes from near Bonnie Doon (R. S. A. Bot. Gard. Occ. Papers 1:41). Dr. S. F. Blake has since informed me that the material upon which I based my report is a form of *A. ericoides*. Recent studies of herbarium material and of the plants at Bonnie Doon have convinced me that the plants in question are a heretofore undescribed subspecies of *A. ericoides*. Although there are several collections of this new subspecies from the Santa Cruz Mts., it is unlikely that they were available for examination when Dr. Hall monographed the genus (Carn. Inst. Wash. Publ. 389. 1928.), for he placed considerable emphasis on the fact that the achenes of *A. ericoides* were strictly glabrous and would have welcomed material with pubescent achenes as an indication of closer phylogenetic relationship within the section *Ericameria*.

Aplopappus ericoides (Less.) Hook. & Arn. Bot. Beech. Voy. 146. 1833.

A compact, usually well rounded, soft-wooded shrub, 1 to 1.5 m. high. Branchlets densely leafy, sparsely tomentulose to nearly glabrous, usually resinous. Leaves filiform; principal or primary leaves 0.5 to 1.5 cm. long; secondary leaves several in each axil, shorter to nearly as long as the primary ones. Flower heads congested at the tips of the branchlets, forming a cymose-paniculate inflorescence; bracts in 3 or 4 series, mostly 15-20; ray flowers 3-6; disc flowers 8-14; achenes 3 to 4 mm. long, glabrous or puberulent, striated, pappus copius, dull white to brownish in age .

Habitat. Sand dunes along the coast and in sand hills of the Santa Cruz Mts.

Range. CALIFORNIA: extending along the immediate coast from Bolinas Bay, Marin Co. to near El Segundo, Los Angeles Co.; also in the Santa Cruz Mts., Santa Cruz Co.

KEY TO THE SUBSPECIES

Achenes glabrous . . . . . *A. ericoides typicus*
Achenes puberulent . . . . . *A. ericoides Blakei*

Aplopappus ericoides typicus C. B. Wolf, subsp. nom. nov.
Achenes strictly glabrous. (*A ericoides* (Less.) Hook & Arn., l. c.).

Habitat. Sand dunes in the vicinity of the coast, often associated with *Lupinus Chamissonis, Lupinus arboreus* and *Franseria Chamissonis*. Humid Transition and Upper Sonoran Zones.

Range. CALIFORNIA: Bolinas Bay, Marin Co. to near El Segundo, Los Angeles Co.

Type Locality. CALIFORNIA. The type collection was made by Chamisso in 1836, specimens of which are in the De Candolle Herbarium at Geneva and in the Herbarium of the Botanical Museum and Gardens in Berlin.

Representative Specimens Examined. (Subspecies *typicus* is a well known entity and is represented by numerous collections from along the California coast, so it is hardly necessary to cite more than a few representative sheets) CALIFORNIA: SANTA CRUZ CO.: mts. north of Santa Cruz, State Geological Survey *816* (UC), this is the only specimen seen of subspecies *typicus* from an inland station. MONTEREY CO.: 4 mi. from Watsonville on road to Monterey, *C. B. Wolf 3792* (RSA, 2-4); Seaside, *C. B. Wolf 1812* (RSA, DS, UC, UCLA, P); 6 mi. south of Carmel, *E. R. Johnson 5419* (RSA). SANTA BARBARA CO.: 1 mi. south of Surf, *C. B. Wolf 2305* (RSA, DS, UC, CA, P, UCLA). LOS ANGELES CO.: bluffs at Playa del Rey, *C. B. Wolf 2640* (RSA, 2-6).

Aplopappus ericoides Blakei C. B. Wolf, subsp. nov.

(Figure 24)

Differs from subspecies *typicus* in that the achenes are puberulent and that the heads are usually somewhat larger and contain a few more disc flowers.

A subspecie *typicus* differt: seminibus puberulentibus.

Habitat. Sand hills in association with *Pinus attenuata, ponderosa, Cupressus sp., Arctostaphylos sp.* and *Quercus Wislizenii*. Arid Transition Zone at about 1500 ft.

Range. CALIFORNIA: Santa Cruz Co., Santa Cruz Mts., at Eccles, Glenwood, Mt. Herman and Bonnie Doon.

Type Locality. Santa Cruz Mts., 7/10 miles east of Bonnie Doon School, Santa Cruz Co., California. Type specimen: collected Nov. 9, 1934, *C. B. Wolf 6237,* R. S. A. Bot. Gard. Herb., sheet no. 12773. Isotypes distributed as cited below.

Specimens Examined. CALIFORNIA: SANTA CRUZ CO.: sandy ground below Eccles, *W. R. Dudley,* Oct. 3, 1896 (DS); Glenwood, *Horace*

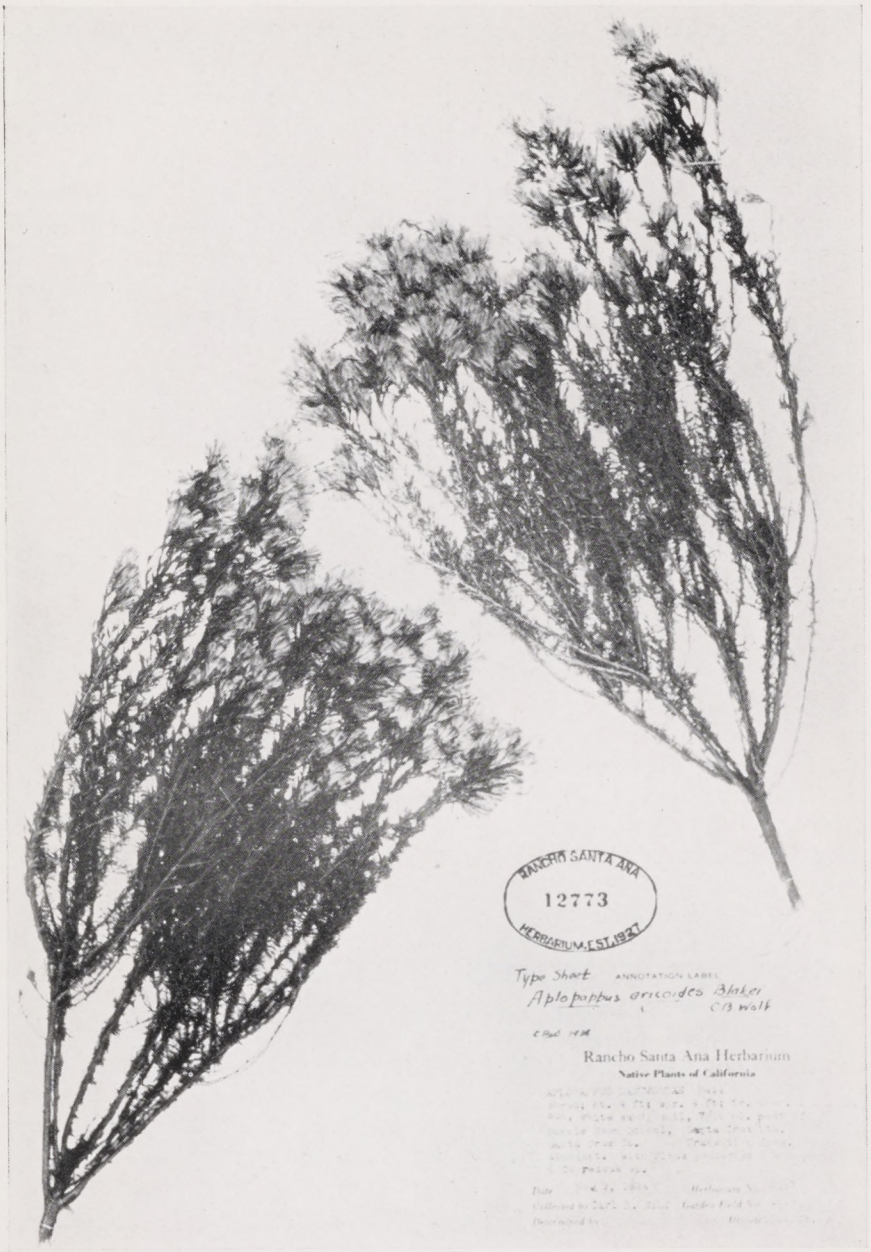

FIGURE 24. Aplopappus ericoides Blakei C. B. Wolf. Type Specimen: 7/10 mi. east of Bonnie Doon School, Santa Cruz Mts., Santa Cruz Co., California, **C. B. Wolf 6237**, Nov. 9, 1934, R. S. A. Bot. Gard. Herb., sheet no. 12773. Three-eigths size.

Davis, Sept. 1907 (DS); Mt. Herman, *A. E. Weislander 2457* (UC); 7/10 mi. east of Bonnie Doon School, *C. B. Wolf 6237* (RSA, DS, UC, P, CA, UCLA, U. of MONTANA, AA, US, GRAY, BLAKE).

It is a pleasure to associate the name of Dr. S. F. Blake with this California plant, for he has already contributed greatly to the knowledge of the *Compositae* in California.

Chrysothamnus albidus (Jones) Greene, Erythea **3:** 107. 1895.

This white-flowered halophyte of Utah and Nevada was reported for California upon a specimen in the Gray Herbarium from Owens Valley by *Kellogg* in 1875 (Hall & Clements, Phylog. Meth. Tax. 193. 1923.), but no recent collections of the species have been made in that region. The species occupies an area several miles in extent in the Amargosa Desert in the Death Valley region of Inyo County, California and it is strange that it has escaped notice for so many years. COLLECTION: INYO CO.: 4 mi. so. of Shoshone, Oct. 10, 1935, *C. B. Wolf 7678* (RSA, 2-8, 9-10).

Baccharis pilularis DC. subsp. **consanguinea** (DC.) C. B. Wolf, R. S. A. Bot. Gard. Occ. Papers **1:** 21. 1935.

In making the above combination I overlooked the following synonym: *Baccharis pilularis* DC. var. *consanguinea* (DC.) O. Kuntze, Rev. Gen. Pl. 1: 319. 1891.

Oxytenia acerosa Nutt. Pl. Gamb. 172. 1848.

The first report of this species for California seems to have been by Coville (Contr. U. S. Nat. Herb. 4: 128. 1893.), who saw it between Amargosa and Resting Springs during the winter, but failed to collect specimens. Recent manuals of California botany have included the species, but I have been unable to locate specimens to substantiate their claims and have concluded that the authors relied on Coville's report for the occurence of the species in California. In 1935 we collected extensively in the Death Valley region and particularly around Tecopa, Amargosa Desert. *Oxytenia acerosa* is a comparatively abundant halophyte in the low, alkaline flats of the Amargosa Wash from near Shoshone to Tecopa. At the latter locality the plant grows along the edges of the marshy ground in which there are great quantities of *Phragmites communis.* COLLECTION: Tecopa, Inyo Co., Oct 10, 1935, *C. B. Wolf 7669* (RSA, 2-7, 8a-11).

Wyethia ovata Torr. & Gray; Emory, Notes Mil. Reconnois. 143. 1848.

This species, although common in a number of the mountains of southern California, does not seem to have been reported from the Santa

Ana Mts. COLLECTION: ORANGE CO.: Santa Ana Mts., Los Piños Potrero, 3000 ft., June 18, 1935, P. C. *Everett 7198* (RSA, 2-7, 8a-12).

Baileya multiradiata Harv. & Gray, ex Torr. in Emory, Notes Mil. Reconnois. 144. 1848.

The differences between this species and *B. pleniradiata* Harv. and Gray, l. c. are well marked, but some authors have considered the latter to be but a variety of the former. In *B. multiradiata* the plant becomes woody at the base, the leaves are mainly basal and the flowers are large and borne singly on long peduncles. In *B. pleniradiata* the plant is rarely at all woody, is leafier and the flowers are smaller, more numerous and borne on branching, shorter peduncles. Field studies of these two species have shown that *B. pleniradiata,* which is widespread on the Colorado and Mojave Deserts, is characteristically and inhabitant of the fine soils of the valleys and flats and is essentially an annual. On the other hand, *B. multiradiata* inhabits the better drained rocky or gravelly mesas and slopes and is never found in large masses. Near Valley Wells, in the eastern Mojave Desert, *B. pleniradiata* grows in great profusion in the sandy soil of the open valley. COLLECTION: 2 mi. w. of Valley Wells, San Bernardino Co., 3700 ft., May 26, 1935, *C. B. Wolf 6999* (RSA, 2-7, 8a-15). A short distance to the east on the mesas leading to Pachalka Spring on Clark Mt. *B. multiradiata* is plentiful. COLLECTION: 1 6/10 mi. w. of Pachalka Spring, Clark Mt., San Bernardino Co., 4600 ft., May 26, 1935, *C. B. Wolf 7000* (RSA, 2-7, 8a-14).

Under cultivation at the Garden the above two collections do equally well, but retain their distinctive features, and, as in the field, we have yet to observe individuals suggesting intermediate or hybrid forms between the two species.

Cirsium neomexicanum Gray, Pl. Wright. **2:** 101. 1852.

We reported this species for California from Hackberry Mt., eastern Mojave Desert (R. S. A. Bot. Gard. Occ. Papers 1: 42. 1935.). Our explorations in the Mojave Desert since that time have disclosed that the species is comparatively widespread and abundant in a number of areas in the eastern Mojave Desert of California. COLLECTIONS: SAN BERNARDINO CO.: Kingston Mts., 1 4/10 mi. northwest of Beck Spring, May 14, 1935, *C. B. Wolf 6804* (RSA, 2-5); southern portion of Kingston Mts., in pass between Kingston and Francis Spring, May 15, 1935, *C. B. Wolf 6858* (RSA, 2-6); Clark Mt., 1 1/2 mi. above Pachalka Spring, in 2nd. canyon to east, May 26, 1935, *C. B. Wolf 7024* (RSA); Avawatz Mts., Cave Spring, May 26, 1937, *C. B. Wolf* & *E. R. Johnson 8760* (RSA, 2-4).

RANCHO SANTA ANA BOTANIC GARDEN
of the
Santa Ana Cañon, Orange County, California
Established 1927 in Memory of
JOHN W. BIXBY

Dedication of Garden Foundation to the Board of Trustees September 21, 1934, for the Rancho Santa Ana Botanic Garden of the Native Plants of California:

"THE NATURE, OBJECT AND PURPOSE OF THE INSTITUTION HEREBY FOUNDED AND TO BE MAINTAINED HEREUNDER.

ITS NATURE: A botanic garden of the native plants of California, herbarium and botanical library, containing living and/or preserved specimens of trees, plants and flowers native to California, and literature relating thereto.

ITS OBJECT: The preservation and improvement of the property now transferred and such property as may hereafter be transferred to the Trustees for those who not only wish to enjoy, but to study, assembled in one accessible locality, native California plants; and for the advancement of science and education with reference to plant life indigenous to the State of California.

ITS PURPOSES. (a) An institution founded primarily for scientific research in the field of local botany.

(b) To preserve the native California flora, try to replenish the depleted supply of some of the rarest plants which are rapidly being exterminated, and bring together in a comparatively small area as complete a collection of the rich store of native California plants as can be grown in this southern section of the state, thereby promoting the general welfare of the people of the state by providing the means for encouraging and carrying on the above mentioned activities in said state and by doing such other things as may be necessary and desirable to carry out the objects hereof."

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